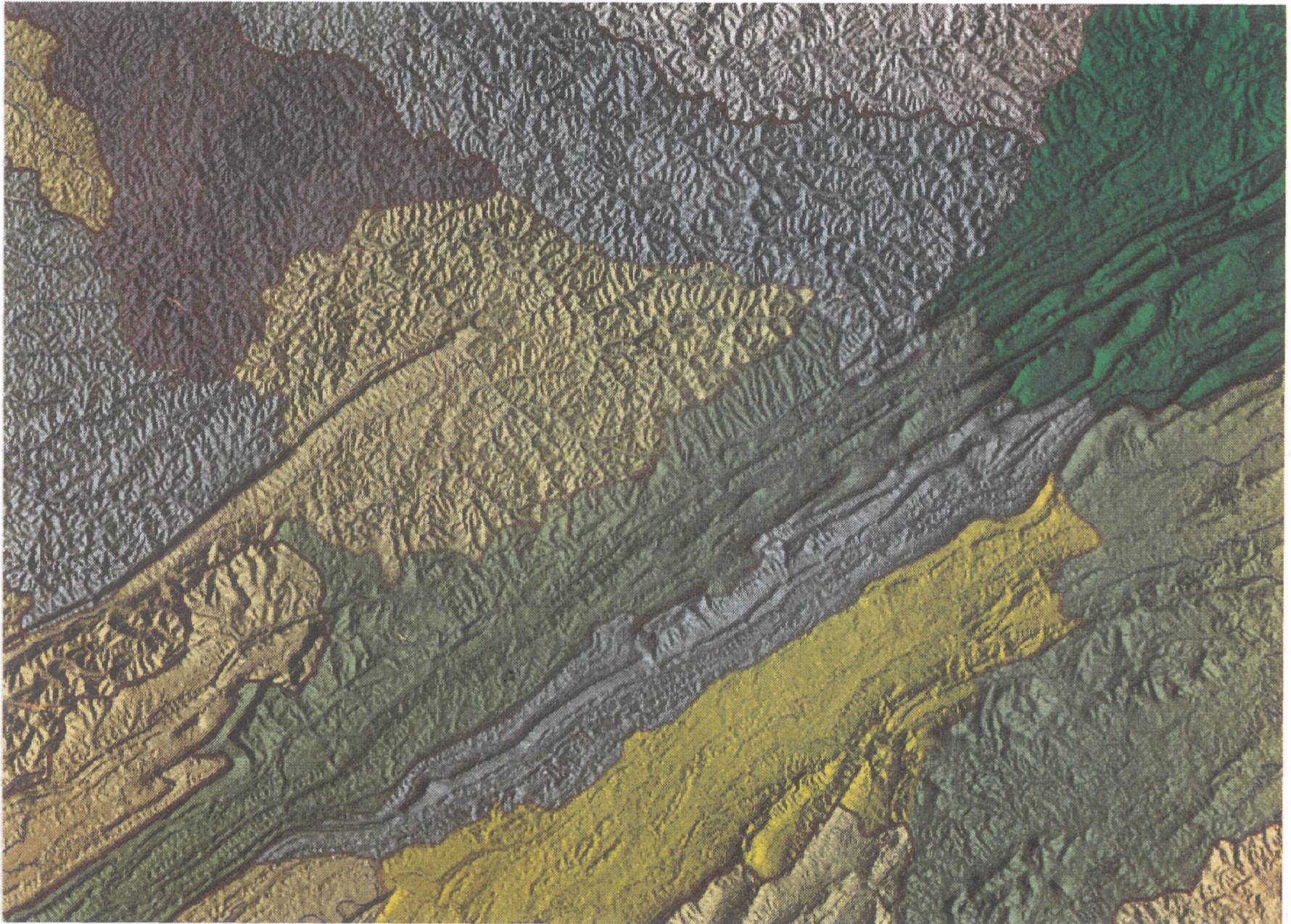




The Index of Watershed Indicators



INDEX OF WATERSHED INDICATORS

Twenty-five years ago the 92nd Congress took a bold step to maintain and restore our Nation's waters by enacting the Federal Water Pollution Control Act, now known popularly as the Clean Water Act. We can be proud of the outstanding progress the Nation has made in improving water quality in the last century. This progress is the result of cooperative efforts by Federal, State, Tribal, regional, and local governments, volunteers, and people in private enterprise. This progress is all the more remarkable considering that our economy and population both grew rapidly over the period.

We must maintain the strong foundation of basic national water protection programs that we have worked so hard to put in place and which has brought about much of the progress to date. **But, if we are to maintain steady progress toward our goals of clean water and safe drinking water, we must increase our capacity to identify water quality problem areas and design tailored programs to address the causes of problems that differ from place to place.** As part of this effort, we are working with all our monitoring partners to upgrade and streamline the water monitoring program and to improve the process of identifying impaired waters in each State. Perhaps most important, we must develop new tools to describe the overall health of aquatic systems on a watershed basis. As John Wesley Powell defined it, a watershed is an "area of land, a bounded hydrologic system, within which all living things are inextricably linked by their common water course and where, as humans settled, simple logic demanded that they become part of the community."

This Index of Watershed Indicators (the Index) is the first national effort to organize nationally available aquatic resource information and present it at the watershed level. The Index is built on 15 different water resource indicators using information from a variety of public and private partners. Drawing on these indicators, the Index provides a description of the condition and vulnerability of each of the 2,111 watersheds in the continental United States. We will include Alaska and Hawaii later.

By organizing water resource information at a watershed scale, we can inform and improve the dialogue among watershed managers, water quality professionals, and citizens on the condition of our watersheds and the actions needed to protect or restore water quality. To enlarge this dialogue and tap the energy and creativity of a broader segment of the populace, watershed information needs to be widely available. To meet this goal, we designed the Index so that both national databases and the descriptions of each watershed are available on the Internet. Using the Index, we can inform and empower citizens to better understand conditions in the watershed where they live and to be part of the solution of preserving or restoring healthy aquatic systems.

The Index is the result of a cooperative, multi-year process involving U. S. EPA and many public and private agencies and organizations. I want to express my sincere appreciation to everyone who contributed to this challenging, ground-breaking effort. I especially want to commend States that have made the vital commitment to strong water quality monitoring programs. A number of these States stepped forward with detailed monitoring data, knowing that their data would show problems that would not be apparent in States with more limited monitoring programs.

Finally, it is important to note that this first effort to characterize watershed condition and vulnerability can and will be improved. Some indicators will be revised as data are improved. New indicators such as groundwater will be added as better data are developed. In addition, the Index is an aggregation of data from national databases, not a detailed, on-the-ground assessment of each watershed. U.S. EPA, States, Tribes and others have more detailed information in specific places to help watershed managers design more detailed watershed assessments. Much of this information is available on the Internet at <http://www.epa.gov/surf> and I urge others to link their information to this program to provide an electronic index of comprehensive water quality data.

I am confident that, working together to better understand the condition of aquatic resources on a watershed basis, we can all look forward to continued steady progress in improving water quality.

Bob Perciasepe
Assistant Administrator for Water
U.S. Environmental Protection Agency

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The Process to Produce the Index of Watershed Indicators

The U. S. Environmental Protection Agency's Office of Water and its many public and private partners have developed this Index of Watershed Indicators as a national presentation of aquatic resource health. The Index is designed to collect, organize, and evaluate multiple sources of environmental information on a watershed basis. A watershed is an area of land, bounded by ridge lines, that catches rain and snow and drains into a marsh, stream, river, lake, estuary, or groundwater aquifer. There can be many types of waters in a watershed, including lakes, rivers, estuaries, wetlands, streams, aquifers, and ground water recharge areas as well as the surrounding landscape and activities which affect the waters. It is possible to delineate watersheds in a variety of sizes ranging from the Mississippi River watershed, which encompasses most of the central United States, to watersheds draining small, tributary streams.

Watershed delineation: For the purposes of this project, watersheds are delineated using the U.S. Geological Survey's 8-digit Cataloging Unit (CU), which is the smallest consistent national watershed size. Using this system, the United States is divided into 2,149 watersheds which range in size according to the area that the water drains. (Note that in some cases, States and Tribes delineate smaller or differently configured watersheds for their own purposes.) This initial product, which is Phase 1 of the Index of Watershed Indicators, shows only the 2,111 watersheds in the continental United States. Alaska and Hawaii will be included in Phase 2, which begins upon publication of Phase 1 in July 1997.

Many of the remaining water quality problems in the United States can be addressed most effectively along watershed lines. The U. S. EPA, States, Tribes, and other agencies are all moving toward a watershed-based approach to environmental protection. This entails integrating traditional program areas (e.g., flood control, wastewater, and land use) and improving coordination between local, State, Tribal, regional, national and private partners. A major benefit of the watershed approach is that attention is placed on the achievement of measurable environmental results.

Index objectives: The Index of Watershed Indicators has four primary objectives. These are to:

- characterize the condition and vulnerability to pollution of the watersheds of the United States;
- provide the basis for dialogue between water quality managers;
- empower citizens to learn more about their watersheds and work to protect them; and
- measure progress toward EPA's goal that all watersheds will be healthy and productive places.

The indicators: In order to meet these objectives, U. S. EPA and its partners selected 15 separate water quality indicators. Together these indicators were used to create an index of water quality on a watershed basis. The data behind each of the 15 indicators come from a variety of sources such as States, Tribes, U. S. EPA, U.S. Census Bureau, the Natural Resources Conservation Service of the U.S. Department of Agriculture, National Oceanic and Atmospheric Administration, The Nature Conservancy, U.S. Army Corps of Engineers, U.S. Geological Survey, U.S. Fish and Wildlife Service, and the many public and private individuals who contribute data to the national databases that these organizations maintain.

The 15 data layers of the Index of Watershed Indicators consist of two categories of information: **Condition** and **Vulnerability**. The condition data layers (maps 1-7) are designed to show existing water quality across the country. The vulnerability data layers (maps 8-15) are designed to indicate where discharges and other stressors impact the watershed and could, depending on the natural and manmade factors present in the watershed, cause future problems to occur. Note that several indicators used in the Index of Watershed Indicators characterization consist of indices combining more than one kind of data. For three indicators, more detail is provided in supplemental maps at the end of this report.

The following indicators are used to characterize condition:

- 1) Assessed Rivers Meeting All Designated Uses Set in State/Tribal Water Quality Standards
- 2) Fish and Wildlife Consumption Advisories
- 3) Indicators of Source Water Condition for Drinking Water Systems
- 4) Contaminated Sediments
- 5) Ambient Water Quality Data - Four Toxic Pollutants
- 6) Ambient Water Quality Data - Four Conventional Pollutants, and
- 7) Wetland Loss Index

The following indicators are used to characterize vulnerability:

- 8) Aquatic/Wetland Species at Risk
- 9) Pollutant Loads Discharged Above Permitted Limits - Toxic Pollutants
- 10) Pollutant Loads Discharged Above Permitted Limits - Conventional Pollutants
- 11) Urban Runoff Potential
- 12) Index of Agricultural Runoff Potential
- 13) Population Change
- 14) Hydrologic Modification Caused by Dams
- 15) Estuarine Pollution Susceptibility Index

The maps of each indicator show where general patterns in water quality exist and where we are missing data. Each data layer map also includes important information such as why the data layer is important, how to access the background data we used, who to contact for more information, and descriptions of data quality.

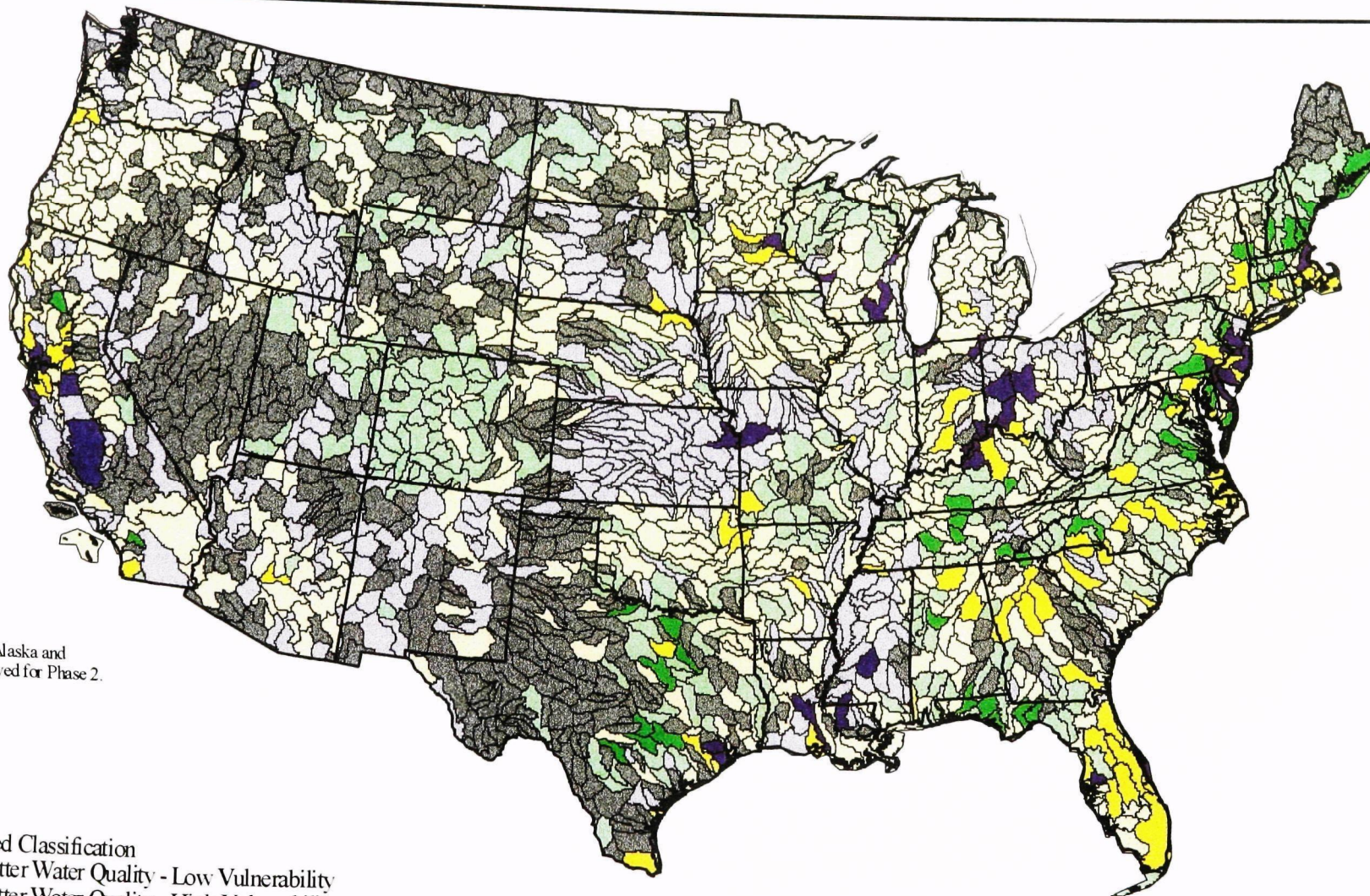
Data quality: Data layers used to characterize aquatic resource health must be of adequate data quality. The data layers represented in this report contain measurements of varying quality and were originally collected for other purposes. These measurements differ in precision, accuracy, statistical representativeness, and completeness. Data collection methods and purpose, quality control and age of data vary. This national report uses data from several agencies who have undertaken data quality assessments for their original purposes. The data quality of each data layer as it is used in the Index of Watershed Indicators is specifically identified in this report. Data of mixed quality are included for two reasons: (1) the data layer describes an important, if as yet imperfect, way to measure a nationwide objective, and (2) efforts are underway to improve data layer measurements in future reports. Each watershed profile available on Internet and the data summaries below show the level of data quality for the national data set using the following descriptions:

- Data consistent/sufficient data collected
- Data somewhat consistent/additional data needed
- Data need to be much more consistent/much additional data needed

Index improvements: Although the Index of Watershed Indicators is still in its first phase of development, beneficial impacts are already apparent. For instance, the Index of Watershed Indicators has significantly improved many data sets supporting the characterization. Agencies examining the Index of Watershed Indicators data are building closer relationships as they work to integrate these diverse data sets. In addition, other agencies and organizations are using the Index of Watershed Indicators framework to conduct their own, more detailed assessments of water quality on a watershed basis (e.g., New England States, U. S. EPA Region 3, and the Natural Resources Conservation Service). In addition, the Index of Watershed Indicators is expanding our capacity to communicate with our partners, review and comment on data and its significance, and disseminate information to water quality managers and the public, particularly using the Internet and electronic information transfers.








U.S. EPA and its partners will be continuing to build upon and improve this index. As new data becomes available, the data layer maps and composite index will be updated on U.S. EPA's "Surf Your Watershed" website found at: <http://www.epa.gov/surf>

National Watershed Characterization



Analysis of Alaska and
Hawaii reserved for Phase 2.

Watershed Classification

-  Better Water Quality - Low Vulnerability
-  Better Water Quality - High Vulnerability
-  Less Serious Water Quality Problems - Low Vulnerability
-  Less Serious Water Quality Problems - High Vulnerability
-  More Serious Water Quality Problems - Low Vulnerability
-  More Serious Water Quality Problems - High Vulnerability
-  Data Sufficiency Threshold Not Met

Index of Watershed Indicators

<http://www.epa.gov/surf>

Importance of the National Watershed Characterization

The Index of Watershed Indicators characterizes the condition and vulnerability of aquatic systems in each of the 2,111 watersheds in the continental U.S. This involves an assessment of condition, vulnerability, and data sufficiency.

The approach is simple. First, indicators of the condition of the watershed are scored and assigned to one of three categories: better water quality, water quality with less serious problems, and water quality with more serious problems. Second, indicators of vulnerability are scored to create two characterizations of vulnerability: high and low. These two sets of indicators are then combined to create the following spectrum:

1. Watersheds with better water quality and lower vulnerability to stressors such as pollutant loadings
2. Watersheds with better water quality and higher vulnerability to stressors such as pollutant loadings
3. Watersheds with less serious water quality problems and lower vulnerability to stressors such as pollutant loadings
4. Watersheds with less serious water quality problems and higher vulnerability to stressors such as pollutant loadings
5. Watersheds with more serious water quality problems and lower vulnerability to stressors such as pollutant loadings
6. Watersheds with more serious water quality problems and higher vulnerability to stressors such as pollutant loadings
7. Watersheds for which insufficient data exists to make an assertion of condition or vulnerability

The Index of Watershed Indicators shows that about:

- 16% of the watersheds in the country have better water quality and of these, one in eight have high vulnerability;
- 36% have some water quality problems and of these, about one in ten these high vulnerability;
- 21% have more serious water quality problems with one in ten of these exhibiting high vulnerability; and,
- 27% of the watersheds in the continental United States do not have enough information on the component indicators to make an overall assessment.

The information provided by the Index of Watershed Indicators will help focus the attention of water quality managers and decision makers on areas with problems in need of restoration, on areas with good water quality in need of

protection, and on areas where additional data is needed. When looking at the results of the IWI, however, it is important to note that the strength of monitoring programs varies across the country. Areas with strong monitoring programs may show more problems than those with weaker programs. Good monitoring provides valuable environmental information and should be rewarded.

Access to Detailed Data

Access to detailed data for each data layer is available through "Surf Your Watershed" at: <http://www.epa.gov/surf/TWI/data> Click on the data layer of interest to find documentation and FTP (File Transfer Protocol) addresses.

Data Sufficiency Thresholds

Data sufficiency thresholds levels were set for data in both the condition and vulnerability categories. These threshold levels ensure that sufficient data exists to make a valid judgement of aquatic resource health. For the condition data layers, each watershed must have information for at least four out of seven data sets or they are considered to have "Insufficient Data." A similar data sufficiency screen is applied to vulnerability data, where at least six of the eight indicators are needed.

Notes on Interpreting this Information

- *This map combines 15 disparate data layers as listed above. All of the notes listed for the component data layers must be taken into account when using this map.*
- *State water quality assessments (305(b) designated use data) were given special consideration. First, when State 305(b) data were present, this data layer was weighted six times more heavily than other data layers. Where they were absent, the data from other condition indicators were weighted more heavily to compensate for this missing information*

Plans to Improve this Data Layer

As the data for each of the component data layers is improved, the overall Index of Watershed Indicators map will also improve. U.S. EPA will continue to work on revising the scoring system to ensure it reflects aquatic resource condition and vulnerability as accurately as possible.

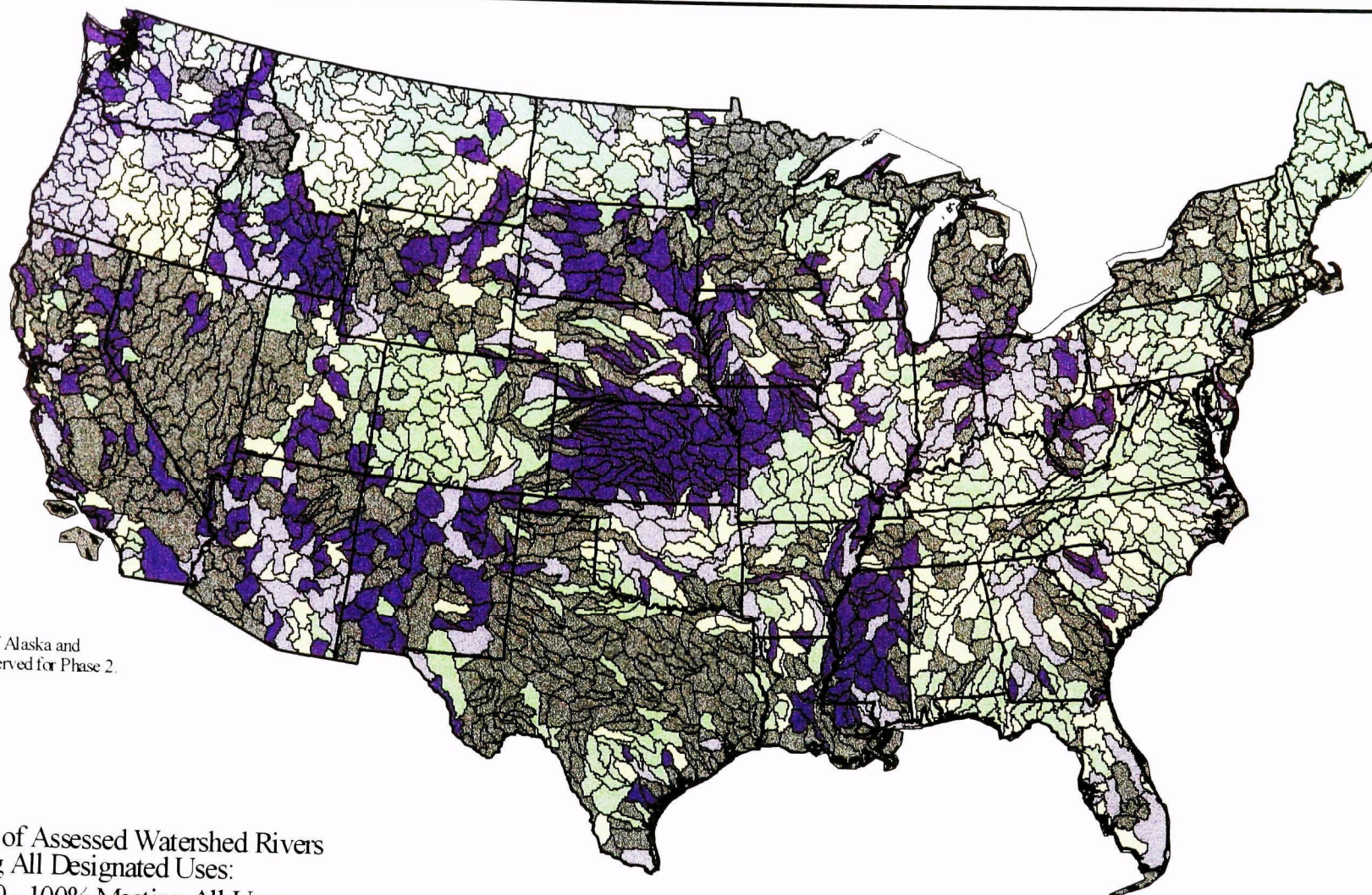
For More Information Contact:

Individual Contact

Charles Spooner, 202 260-1314

E-mail: Spooner.Charles@epamail.epa.gov

1. Assessed Rivers Meeting All Designated Uses Set in State/Tribal Water Quality Standards 1994/1996



Analysis of Alaska and
Hawaii reserved for Phase 2.

Percent of Assessed Watershed Rivers
Meeting All Designated Uses:

- 80 - 100% Meeting All Uses
- 50 - 79% Meeting All Uses
- 20 - 49% Meeting All Uses
- < 20% Meeting All Uses
- Insufficient IWI Data

Index of Watershed
Indicators

Sources: U.S. Environmental Protection Agency;
National Water Quality Inventory



Importance of Assessed Rivers Meeting All Designated Uses Set in State/Tribal Water Quality Standards

States and Tribes adopt water quality standards that include designated uses and criteria to protect those uses. Uses typically include drinking water supplies, aquatic life use support, fish and shellfish consumption, primary and secondary contact recreation (e.g., swimming and boating), and agriculture. States and Tribes describe water quality in terms of a waterbody either fully supporting, partially supporting, or not supporting the designated use and report this information biennially to U.S. EPA which then compiles it in the National Water Quality Inventory Report to Congress (305(b)) Report.

Access to Detailed Data

Access to detailed data for each data layer is available through "Surf Your Watershed" at:

<<http://www.epa.gov/surf/IWI/data>>. Click on the data layer of interest to find documentation and FTP (File Transfer Protocol) addresses.

Data Sufficiency Thresholds

State and Tribal assessments were considered sufficient to characterize the condition of a watershed if more than 20% of the total perennial stream miles (as expressed by Reach File 3 (RF3)) were assessed. RF3 is a computer database showing the location and flow direction of surface waters compiled from maps produced by the U.S. Geological Survey. 20% approximates the lower 25th percentile of assessed watershed miles for the entire country. Since RF3 total water estimates are not available for U.S. EPA Region 10 States (AK, ID, OR, WA), all watershed data were retained for these watersheds. Section 305(b) data from the Delaware River Basin Commission and the Ohio River Valley Sanitation Commission were used to complement State coverage of those two rivers without applying the 20% test.

Notes on Interpreting this Information:

- *Data Somewhat Consistent/Additional Data Needed*
Nationally, additional data are needed in many places. Reported data are based on National guidelines issued from U.S. EPA, but may vary from place to place due to different water quality standards and methods. See "Plans to Update this Data Layer" for details.
- *States and Tribes do not have identical water quality standards or identical methods or criteria to assess their waters so data may not be consistent.*

- *Most States and Tribes cannot assess all of their waters during each two-year reporting period, and they may modify techniques used or assess different waters every two years.*
- *Most monitoring undertaken by States and Tribes is focused on rivers, lakes and estuaries with suspected or identified pollution problems. Assessments based on this type of monitoring may not be representative of the whole watershed and may overestimate the degree of concern.*

Plans to Improve this Data Layer

U.S. EPA has several initiatives underway to improve the quality of the 305(b) data.

- U.S. EPA is working with States, Tribes, other federal agencies, and other partners to develop monitoring and assessment approaches that will improve state-to-state consistency in reporting.
- U.S. EPA is also working with its partners to achieve comprehensive coverage of the waters in the nation in the 305(b) report, and include annual electronic updates of key data elements.
- This indicator will be updated using the 1996 and subsequent database updates as they become available.

For More Information Contact:

Database Owner:

U.S. EPA, Office of Wetlands, Ocean and Watersheds

Individual Contact:

Charles Spooner

E-mail: Spooner.Charles@epamail.epa.gov

Phone: (202) 260-1314

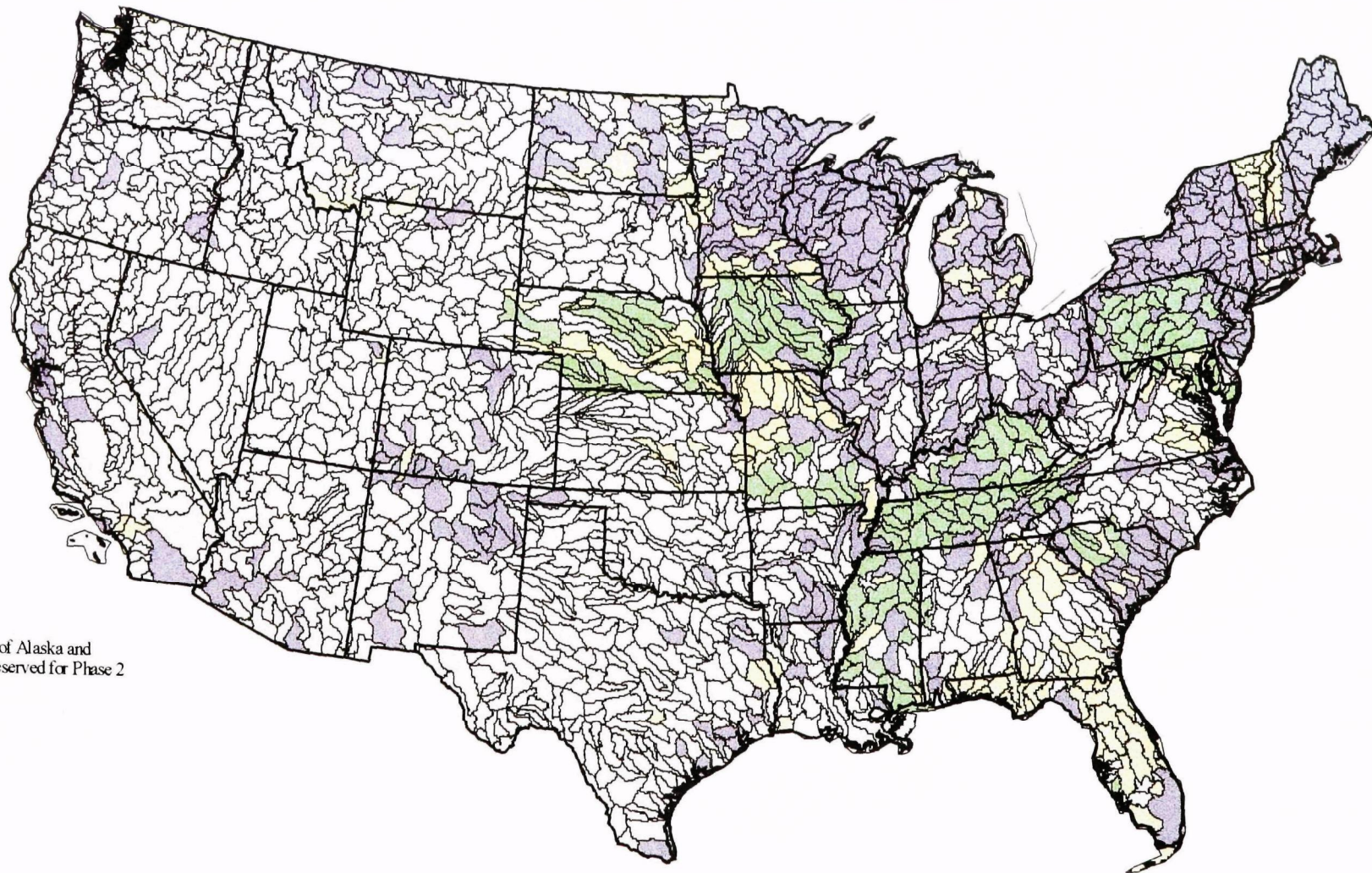
Data Source:

1. National Water Quality Inventory: 1994 Report to Congress
U.S. Environmental Protection Agency, Office of Water Washington, D.C. December 1995. EPA 841-R-95-005.
2. National Assessment Database
U.S. Environmental Protection Agency, Office of Water, 1994
Waterbody System Data
State of Georgia, 1996

Additional Information



For more information on specific State 305(b) reports contact U.S. EPA's Barry Burgan at Burgan.Barry@epamail.epa.gov or (202) 260-7060

2. Fish and Wildlife Consumption Advisories 1995



Analysis of Alaska and
Hawaii reserved for Phase 2

Watershed Classification

-  Monitored with No Active Advisory
-  One or More Advisories Recommending Limits on Fish Consumption
-  One or More Advisories Recommending No Fish Consumption
-  No Recorded Monitoring and No Advisories

Index of Watershed Indicators

Sources: U.S. Environmental Protection Agency:
National Listing of Fish & Wildlife
Consumption Advisories



Map 2

Importance of Fish and Wildlife Consumption Advisories

Fish consumption advisories are a good indicator of the condition of a watershed because they can represent bioaccumulation of toxic substances in fish and shellfish. Bioaccumulation is the process by which fish accumulate pollutants in their tissues by eating smaller organisms already contaminated with the pollutant. Pollutants can also enter fish and shellfish tissue directly from the surrounding water through their gills and skin. These pollutants cause fish and shellfish to be unsafe for human consumption.

States monitor fish to determine whether levels of contamination in fish tissue pose a threat to the health of the people who eat them. Where fish contamination levels exceed safe levels, States often issue advisories to the public recommending some limitation on fish consumption (generally restrictions on the number of meals over a period of time or the fish weight consumed over a period of time) or no consumption of fish at all. Advisories may also target a specific subpopulation at risk such as children, pregnant women, and nursing mothers.

Access to Detailed Data

Access to detailed data for each data layer is available through "Surf Your Watershed" at: <http://www.epa.gov/surf/TWI/data>. Click on the data layer of interest to find documentation and FTP (File Transfer Protocol) addresses.

You can also access the National Listing of Fish & Wildlife Consumption Advisories database on at <http://www.epa.gov/OST/fishadvice/>

Data Sufficiency Thresholds

One smaller waterbody under a fish consumption advisory in a watershed is sufficient to characterize the entire watershed in this analysis. Similarly, data showing that monitoring has occurred and the determination has been made that an advisory is not appropriate is sufficient to characterize a watershed.

Notes on Interpreting this Information

- *Data Somewhat Consistent/Additional Data Needed*
See "Plans to Improve this Data Layer" for details.
- *Characterizations for cross-boundary watersheds may be made due to advisories in only one of the involved States or Tribes, regardless of the amount of area covered by that State or Tribe.*
- *Fish consumption advisories are issued by State, Tribal, local, and federal governments and each uses its own criteria for determining when an advisory is warranted. In addressing these risks, advisories may reflect data from many or a few sites, may vary in the number and types of contaminants considered, may apply to only certain types of waterbodies, and may apply to only certain species or sizes of fish.*
- *Monitoring for fish tissue contamination may be concentrated in areas of most intense fishing or areas suspected of contamination.*
- *For the purposes of this characterization nonconsumption advisories include those issued for the general public and/or for special sub-populations (e.g. pregnant women).*

Plans to Improve this Data Layer

This indicator will be updated using 1996 data and subsequent database updates as they become available. EPA is looking at other sources of data, such as contaminants in fish tissue, that may more accurately reflect bioaccumulation of toxic substances in fish and shellfish.

For More Information Contact:

Database Owner:

U.S. EPA Office of Science and Technology

Individual Contact

Jeff Bigler

E-mail: Bigler.Jeff@epamail.epa.gov

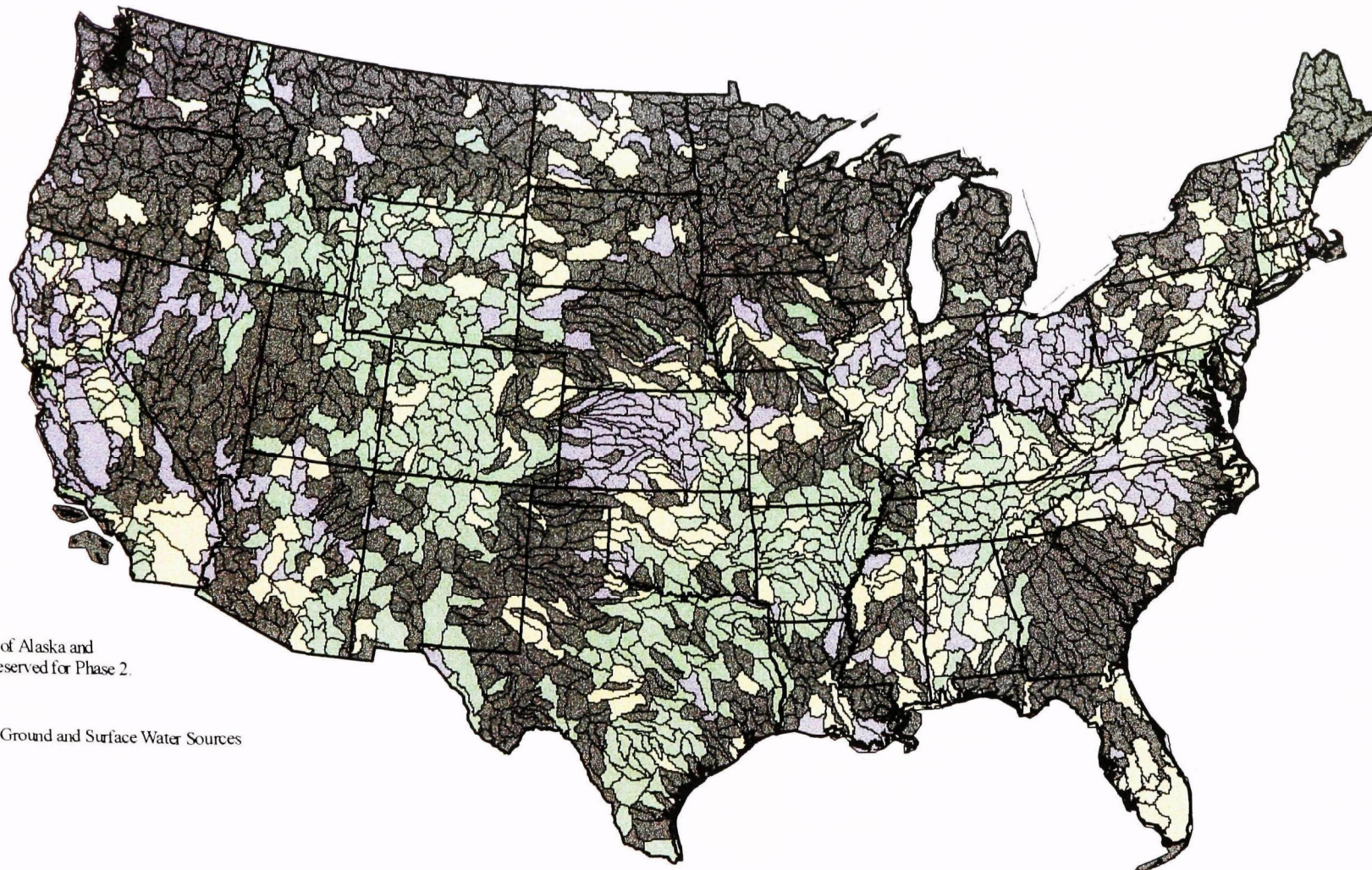
Phone: 202-260-1305

Data Source:

National Listing of Fish & Wildlife Consumption Advisories, 1995

U.S. Environmental Protection Agency, Office of Science and Technology





3. Indicators of Source Water Condition for Drinking Water Systems 1990 - 1996



Analysis of Alaska and
Hawaii reserved for Phase 2.

Includes Ground and Surface Water Sources

Watershed Classification

-  No Significant Source Water Impairment Identified
-  Partial Source Water Impairment Identified
-  Significant Source Water Impairment Identified
-  Data Sufficiency Threshold Not Met

Index of Watershed Indicators

Source: U.S. Environmental Protection Agency



Map 3

Importance of the Indicators of Source Water Condition for Drinking Water Systems

The availability of clean and safe drinking water sources for use by drinking water systems is a good indicator of the watershed's condition. Water systems are major users of the water resources and have continual interest in the quantity and quality of their water supplies. Impaired source waters prompt corrective actions (including additional treatment) by water systems to ensure that the water provided at the tap to consumers meets all drinking water standards.

Data to characterize the quality of these source waters is not available nationally. No single data source currently exists to provide an accurate and complete picture of source water condition. However, using *surrogate* measures from different data sets can provide a *partial* picture of the source water condition. This data layer combines three indicators to identify if there is evidence in the watershed of: (1) no significant source water impairment, (2) partial source water impairment, or (3) significant source water impairment in the watershed.

The three indicators used to characterize source water *condition* were a) rivers and lakes supporting state drinking water designated uses, b) two Safe Drinking Water Information System (SDWIS) surrogate indicators of source water condition; and, c) the occurrence of chemicals regulated under the Safe Drinking Water Act in ambient waters

Although not displayed here, indicators of source water *vulnerability* provide additional evidence of the risk to the use of source waters by water systems. Looking at current source water condition alone provides only a partial picture of source water. Other data layers may provide an indication of the vulnerability to source waters. See Map 12, Index of Agricultural Runoff Potential, for example.

A combined map of source water condition and vulnerability that will include other indicators of condition and vulnerability will be developed for future phases of the Index of Watershed Indicators.

Access to Detailed Data

Access to detailed data for each data layer is available through "Surf Your Watershed" at: <<http://www.epa.gov/surf/IWI/data>>. Click on the data layer of interest to find documentation and FTP (File Transfer Protocol) addresses.

Data Sufficiency Thresholds

Data sufficiency thresholds levels were set for the three data sets used to characterize source water condition (see maps 3a, 3b, and 3c). These threshold levels ensure that sufficient data exists to make a valid judgement of source water condition.

Notes on Interpreting this Information

- *Data Somewhat Consistent/Additional Data Needed*
See "Plans to Improve this Data Layer" for details.
- *The assignment of community water systems to the specific watershed is based in some cases on incomplete locational information and may not accurately represent the water system's source water.*
- *The watershed boundaries used in the IWI are bigger and different than the source water boundaries for many water systems.*
- *Water systems may use water sources that are in more than one watershed, a fact that is not captured in the IWI characterization.*
- *Some public supplies may use ground water sources from a confined aquifer, which may not be representative of the source water condition in the watershed.*
- *This source water condition map combines into one index the three disparate data sets as listed above. All of the notes listed for the component data sets must be taken into account when using this map.*

Plans to Improve this Data Layer

The *partial* characterization of source water condition in the Index of Watershed Indicators Phase I will improve in future phases through four ongoing actions in the drinking water program:

- a) States are required, under the amendments of the Source Water Assessment Provisions of the 1996 Safe Drinking Water Act (SDWA) Amendments, to complete assessments by 1998 for all public water systems;
- b) EPA will work with the States to access more complete source water information;
- c) EPA will develop a more robust ground water data layer in future phases of the Index of Watershed Indicators through collaboration with States, other Federal agencies, and drinking water utility associations; and
- d) EPA will incorporate in the Safe Drinking Water Information System (SDWIS) more complete geographic references to public water system intakes and wellheads, including latitude/longitude coordinates.

For More Information Contact:

Database Owner:

U.S. Environmental Protection Agency

Individual Contact

Carl Reeverts; 202 260-7273; E-mail: Reeverts.Carl@epamail.epa.gov

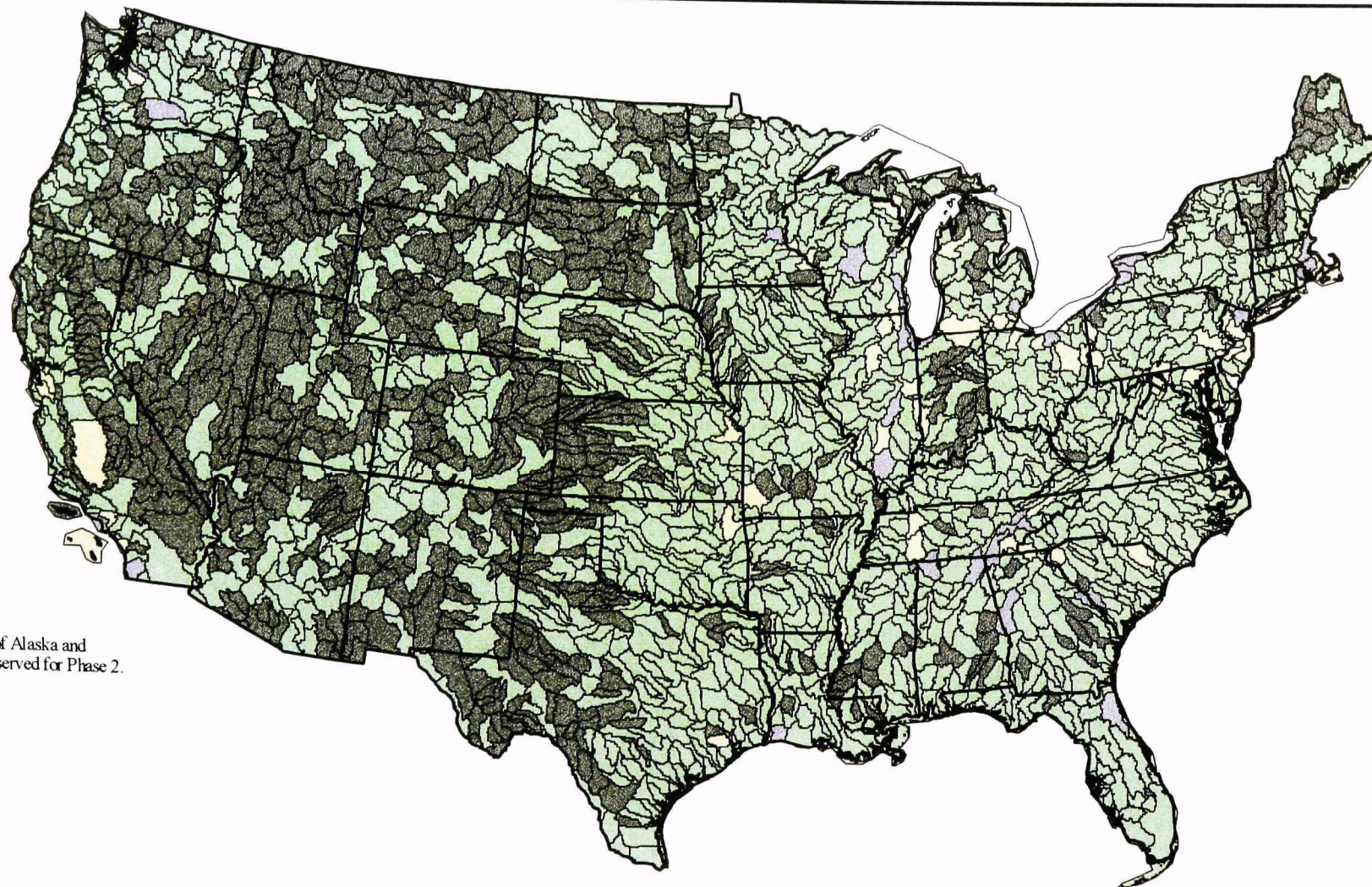
Data Source:

This map is a composite of three maps shown in the Supplemental Maps section.

Sources of data in these maps are:

Map 3a; State FY 1994 305(b) assessments,
Map 3b; SDWIS Violations and Treatment Data,
Map 3c; STORET data .

4. Contaminated Sediments 1980 - 1993



Analysis of Alaska and
Hawaii reserved for Phase 2.

Watershed Classification

- Inconclusive Data
- Moderate Degree of Concern
- High Degree of Concern
- No Data for Assessment

Index of Watershed Indicators

Sources: U.S. Environmental Protection Agency:
National Sediment Inventory



Importance of Contaminated Sediments

Certain chemicals in water tend to bind to particles and collect in bottom sediments. When present at elevated levels in sediments, chemicals can kill or harm bottom dwelling organisms. Pollutants in sediments can also accumulate in aquatic organisms and move up the food chain to fish, shellfish and eventually humans. Because of these effects, the presence of contaminated sediment in a watershed is a good indicator of current aquatic condition.

U.S. EPA has recently completed a national assessment of sediment contamination in waters throughout the United States. As part of this assessment, U.S. EPA compiled existing sediment chemistry, sediment toxicity, and fish tissue residue data from individual monitoring stations throughout the nation. U.S. EPA applied a peer-reviewed weight-of-evidence evaluation to determine the probability of association with adverse effects to human health or aquatic life indicated by the data at each monitoring station. Tier 1 monitoring stations indicate a higher probability of association with adverse effects, and Tier 2 stations indicate lower to intermediate probability of adverse effects. Other monitoring stations do not indicate probability of association with adverse effects.

Access to Detailed Data

Access to detailed data for each data layer is available through "Surf Your Watershed" at: <http://www.epa.gov/surf/IWI/data> Click on the data layer of interest to find documentation and FTP (File Transfer Protocol) addresses.

Data Sufficiency Thresholds

All data U.S. EPA has collected for the National Sediment Inventory (NSI) from States and other sources, such as Federal agencies, is used. The IWI distinguishes between watersheds which have no data and those that have too little data to draw conclusions from.

Notes on Interpreting this Information

- *Data Somewhat Consistent/Additional Data Needed*
See "Plans to Improve this Data Layer" for details.
- *Currently the NSI represents over 20,000 sites but covers only 11% of the Nation's river, lake and coastline sediments. Additional data needs to be collected assessing sediment conditions at more locations.*

- *Watersheds with 20 or more Tier 1 stations and greater than 75% of all stations classified as either Tier 1 or Tier 2 have a high degree of concern; those with 10 or more Tier 1 stations and greater than 75% of all stations classified as Tier 1 or Tier 2 have a moderate degree of concern.*

Plans to Improve this Data Layer

To improve the data quality of this data layer, U.S. EPA will continue to coordinate with U.S. EPA regional offices, States, Tribes, and others to compile and identify additional data. In addition, U.S. EPA is committed to promoting state-of-the-art assessment methods to determine whether sediment at a site poses a risk to human or ecological health.

For More Information Contact:

Database Owner

U.S. EPA Office of Science and Technology
Standards and Applied Science Division

Individual Contact

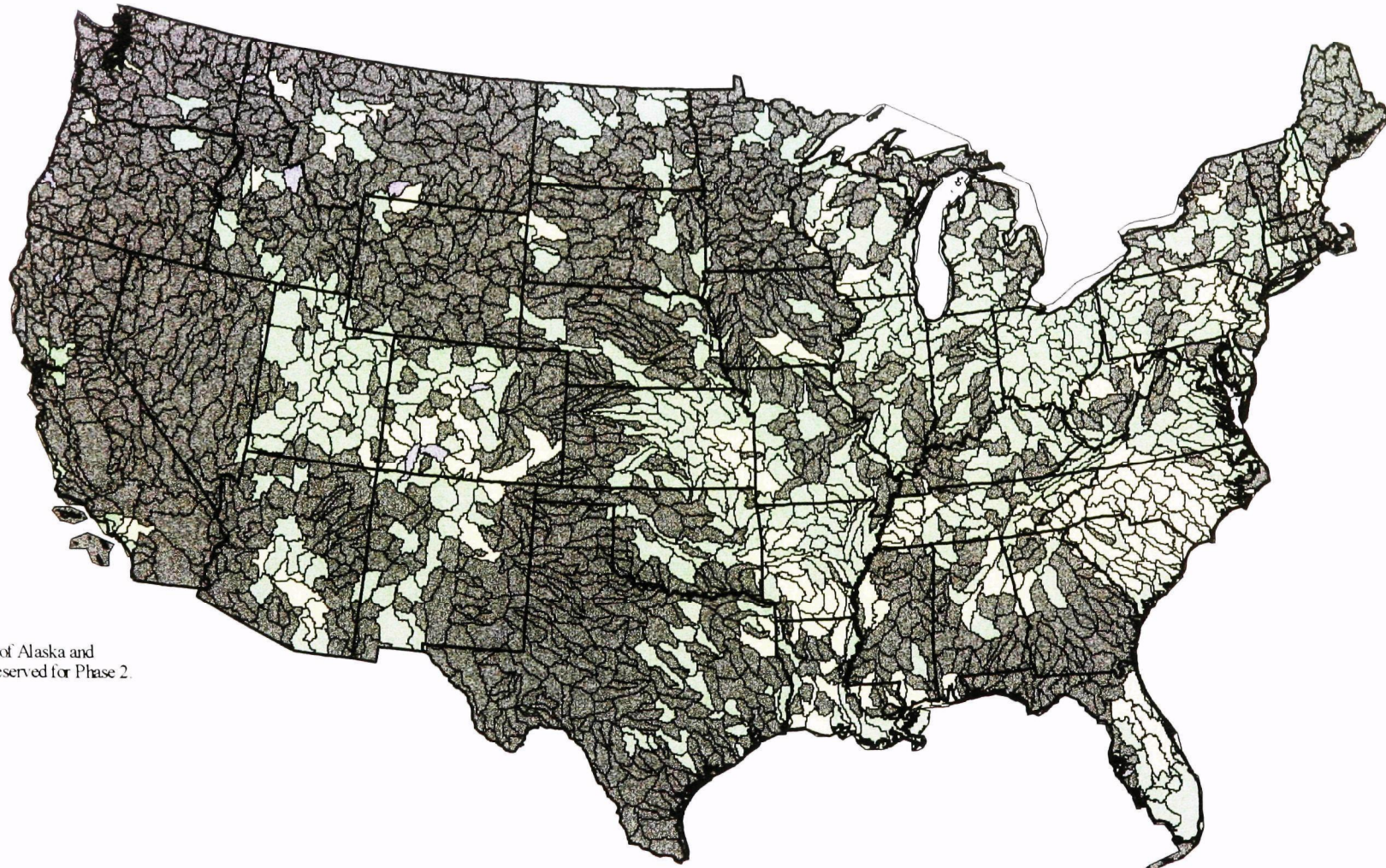
Jim Keating
E-mail: keating.jim@epamail.epa.gov
Phone: (202) 260-3845

Data Source:

National Sediment Inventory (NSI), 1980-1993
U.S. Environmental Protection Agency, Office of Science and Technology





U.S. EPA was specifically mandated by the Water Resources Development Act to compile all existing information on the quantity, chemical and physical composition, and geographic location of pollutants in aquatic sediment, including identification of those sediments which are contaminated. As part of this effort, U.S. EPA collects and evaluates sediment and fish tissue data from State, U.S. EPA regional, and other monitoring programs. The data are stored in the National Sediment Inventory.

5. Ambient Water Quality Data - Four Toxic Pollutants Copper, Chromium (Hexavalent), Nickel and Zinc 1990 - 1995



Analysis of Alaska and
Hawaii reserved for Phase 2.

Watershed Classification

-  0 - 10% Observations in Exceedence of National Criteria
-  11 - 50% Observations in Exceedence of National Criteria
-  >50% Observations in Exceedence of National Criteria
-  Data Sufficiency Threshold Not Met

Index of Watershed Indicators

Sources: U.S. Environmental Protection Agency:
Storage and Retrieval (STORET) System



Map 5

Importance of Ambient Water Quality Data - Four Toxic Pollutants

This data layer describes the degree to which monitoring of ambient concentrations of selected toxic pollutants (copper, nickel, zinc and chromium (hexavalent)) indicate an exceedance of the national chronic level criteria developed by U.S. EPA for the pollutant. (Note that State water quality standards may differ from these numbers.)

Access to Detailed Data

Access to detailed data for each data layer is available through "Surf Your Watershed" at: <<http://www.epa.gov/surf/IWI/data>>. Click on the data layer of interest to find documentation and FTP (File Transfer Protocol) addresses.

Data Sufficiency Thresholds

Each watershed must contain at least 20 observations representing a minimum of five sites over the six year period, 1990-1995.

Notes on Interpreting this Information

- *Data Somewhat Consistent/Additional Data Needed*
See "Plans to Improve this Data Layer" for details.
- *Ambient water quality data from STORET showing percent exceedences over a six year period (1990-1995) are used. The criteria used to calculate exceedences reflect whether fresh or marine waters were being sampled. Marine waters were considered to be those with hardness > 1000 mg/l. Freshwater criteria for copper, nickel and zinc were adjusted for hardness levels at each monitoring site.*
- *The current STORET system contains limited information regarding data quality, and users do not always use identical methods or criteria to assess their waters. Also, much metals data in STORET was collected without the use of ultra clean monitoring methods recommended by the USGS*
- *Most monitoring undertaken by States and Tribes is focused on rivers, lakes and estuaries with suspected or identified pollution problems. Assessments based on this type of monitoring may not be representative of the whole watershed and may overestimate the degree of concern.*
- *National criteria are used because they can be applied across all watersheds universally, but they are not necessarily the levels in State*

water quality standards.

Plans to Improve this Data Layer

- U.S. EPA will explore the use of a translation formula to convert total metals data to the dissolved form.
- U.S. EPA is modernizing the STORET system to make it easier to access data, store information about data quality and equipment used to acquire the data, and expand the fields to store biological and habitat data.
- The U.S. Geological Survey is addressing the issue of metals monitoring by developing ultra clean trace metals monitoring methods. The USGS offers classes teaching these new methods to water quality monitoring professionals.

For More Information Contact:

Database Owner:

U.S. Environmental Protection Agency, Office of Water

Individual Contact:

Louis Hoelman

E-mail: Hoelman.Louie@epamail.epa.gov

Phone: 202 260-7050

Data Source:

STORage and RETrieval System (STORET), 1990-1995

U.S. Environmental Protection Agency, Office of Water.

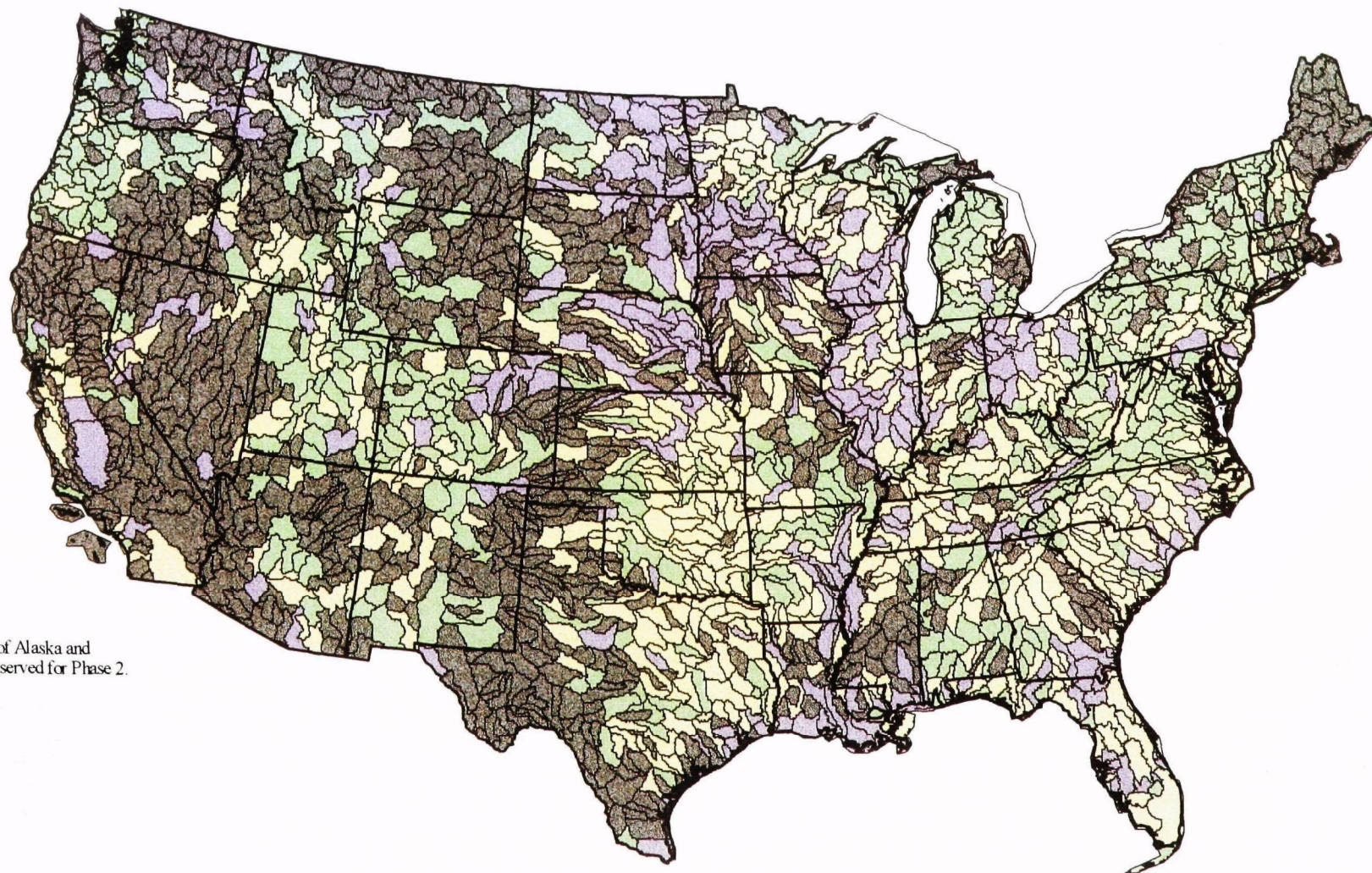
U.S. EPA maintains a national database, the STORage and RETrieval (STORET) system, containing over 250 million observations of water quality monitoring data from multiple sources both public and private. Most recently, the U.S. Geological Survey's National Water Quality Assessment (NAWQA) data has been added to the STORET system.

STORET is designed to store and disseminate basic information on chemical, physical and biological quality of the nation's waterways within and contiguous to the United States.

Additional Information

For additional information on STORET or data in STORET, call the STORET hotline at 1-800-424-9067

6. Ambient Water Quality Data - Four Conventional Pollutants Ammonia, Dissolved Oxygen, Phosphorus and pH 1990 - 1995



Analysis of Alaska and
Hawaii reserved for Phase 2.

Watershed Classification

- 0 - 10% Observations in Exceedence of Selected Reference Level
- 11 - 25% Observations in Exceedence of Selected Reference Level
- >25% Observations in Exceedence of Selected Reference Level
- Data Sufficiency Threshold Not Met

Index of Watershed Indicators

Sources: U.S. Environmental Protection Agency:
Storage and Retrieval (STORET) System



June 27, 1997

Importance of Ambient Water Quality Data - Four Conventional Pollutants

This data layer describes the degree to which monitoring of ambient concentrations of selected conventional pollutants (ammonia, phosphorus, pH, and dissolved oxygen) indicate an exceedance of a national reference level developed by U.S. EPA for the pollutant. For this data layer, ambient water quality data from STORET showing percent exceedences over a six year period (1990-1995) are used. The reference levels for each conventional pollutant are: ammonia (recommended chronic levels for ammonia were taken from Ambient Water Quality Criteria for Ammonia, EPA 440/5-85-001, p. 97 and reflect temperature and pH adjustments), phosphorous (0.1 mg/l), and pH (6.0 to 9.0). Dissolved oxygen is not a pollutant, but is a measure of oxygen demanding wastes. The reference for dissolved oxygen levels is 5 mg/l. Note that State water quality standards may differ from these concentrations.

Access to Detailed Data

Access to detailed data for each data layer is available through "Surf Your Watershed" at: <http://www.epa.gov/surf/IWI/data>. Click on the data layer of interest to find documentation and FTP (File Transfer Protocol) addresses.

Data Sufficiency Thresholds

Each watershed must contain at least 20 observations representing a minimum of five sites over the six year period, 1990-1995.

Notes on Interpreting this Information

- *Data Somewhat Consistent/Additional Data Needed*
See "Plans to Improve this Data Layer" for details.
- *The current STORET system contains limited information regarding data quality and STORET users do not necessarily use identical methods or criteria to assess their waters.*
- *Most monitoring undertaken by States and Tribes is focused on rivers, lakes and estuaries with suspected or identified pollution problems. Assessments based on this type of monitoring may not be representative of the whole watershed and may overestimate the degree of concern.*

- *National reference levels are used because they can be applied across all watersheds universally, but they are not necessarily of concern to individual States.*

Plans to Improve this Data Layer

- U.S. EPA is modernizing the STORET system to make it easier to access data; store information about data quality and equipment used to acquire the data; and expand the fields to store biological and habitat data.

For More Information Contact:

Database Owner:

U.S. Environmental Protection Agency, Office of Water

Individual Contact:

Louis Hoelman

E-mail: Hoelman.Louie@epamail.epa.gov

Phone: 202 260-7050

Data Source:

STORage and RETrieval System (STORET), 1990-1995

U.S. Environmental Protection Agency, Office of Water.

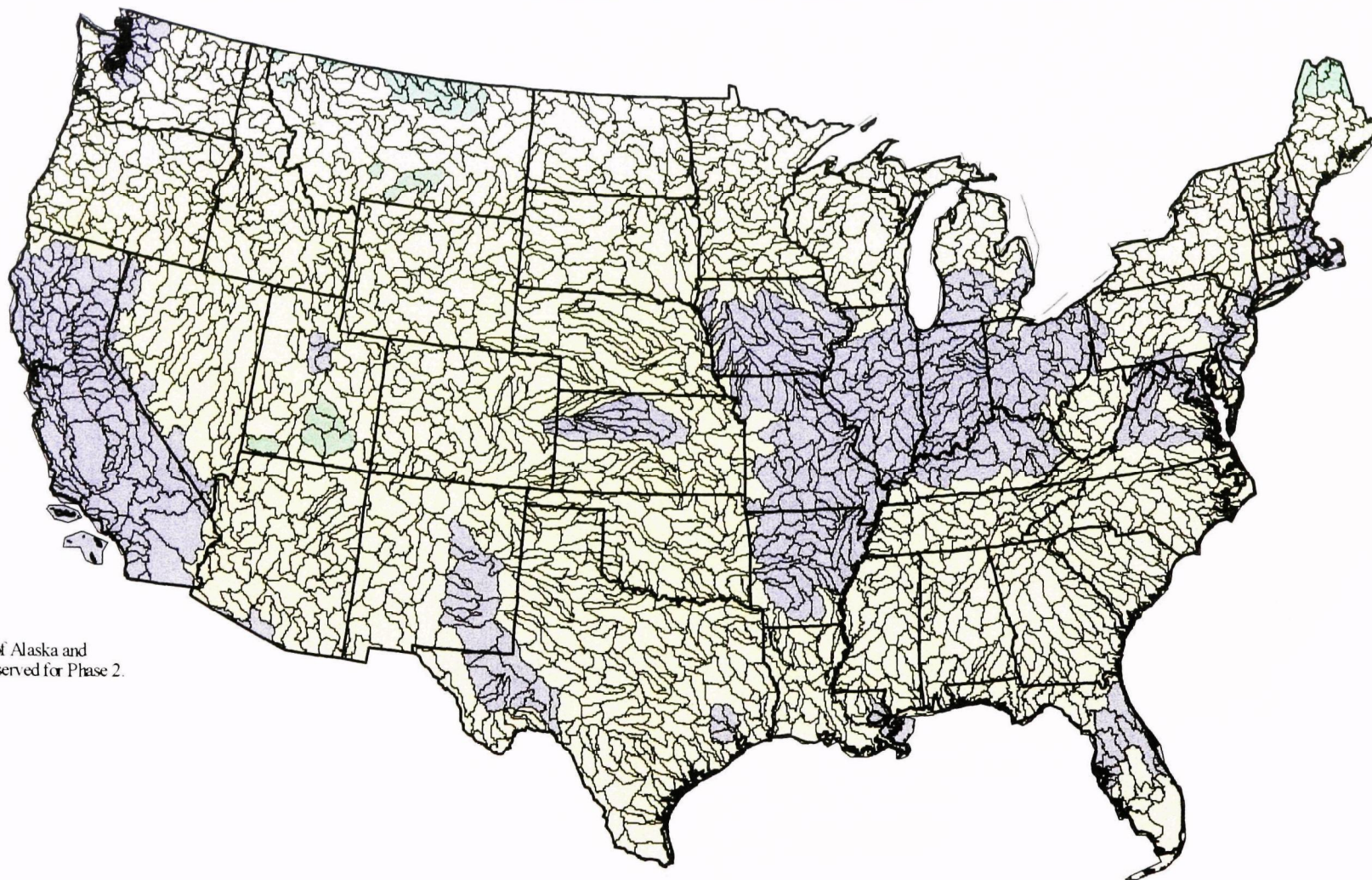
U.S. EPA maintains a national database, the STORage and RETrieval (STORET) system, containing over 250 million observations of water quality monitoring data from multiple sources both public and private. Most recently, the U.S. Geological Survey's National Water Quality Assessment (NAWQA) data has been added to the STORET system.

STORET is designed to store and disseminate basic information on chemical, physical and biological quality of the nation's waterways within and contiguous to the United States.

Additional Information




For additional information on STORET or data in STORET, call the STORET hotline at 1-800-424-9067.

7. Wetland Loss Index Combines Both Recent (1982 - 1992) and Historic (1780s - 1980s) Wetland Loss



Analysis of Alaska and
Hawaii reserved for Phase 2.

Watershed Classification

-  Low Level of Wetland Loss
-  Moderate Level of Wetland Loss
-  High Level of Wetland Loss

Index of Watershed Indicators

Sources: Natural Resources Conservation Service
U.S. Fish and Wildlife Service



June 23, 1997

Map 7

Importance of Wetland Loss Index

Wetlands make important contributions to the health of aquatic systems on a watershed basis by purifying water, filtering runoff, abating floods, and decreasing erosion. In addition, wetlands provide habitat for countless numbers of plants and animals including over 40% of all federally listed threatened or endangered species. Many wetland plants and animals support recreation and commercial industries. For example, wetlands act as nurseries for over 80% of coastal fisheries. In addition, millions of Americans are annually drawn to wetlands for bird watching, hunting, fishing, and enjoying the natural beauty of wetland ecosystems. Although wetland loss rates are slowing, the United States continues to lose approximately 70,000 to 90,000 acres of wetlands on non-federal, rural lands each year.

Access to Detailed Data

Access to detailed data for each data layer is available through "Surf Your Watershed" at: <<http://www.epa.gov/surf/IWI/data>> Click on the data layer of interest to find documentation and FTP (File Transfer Protocol) addresses.

Description of the Data Layer

Recent wetlands loss rates (Map 7a, Natural Resources Inventory (NRI), 1982-1992) were combined with historic loss rates (Map 7b, National Wetlands Inventory (NWI), 1780s-1980s) to form an index. The combined index is a more robust indicator of watershed condition than either loss rate used independently.

- Natural Resources Inventory. Natural Resources Conservation Service (NRCS) reports on wetland acreage on rural, non-federal lands that constitute about 75% of the Nation's land base. (*Reported at 6-digit accounting unit*)
- National Wetlands Inventory. The U.S. Fish and Wildlife Service maintains wetlands acreage data on federal and non-federal lands. (*State level*)

To create the Wetlands Loss Index, The IWI assigned the appropriate NWI State data to Accounting Units and combined it with NRI data. The following chart was used to assign scores (0 = low level of wetland loss, 1 = moderate level of wetland loss, and 2 = high level of wetland loss)

		NRI: % loss between 1982 and 1992 (by 6 digit accounting unit)		
		<0%	0-2%	>2%
NWI Historic % loss from	<30%	0	1	2
1780s to 1980s	30-70%	1	1	2
(by State)	>70%	2	2	2

Data Sufficiency Threshold

All available data were used

Notes on Interpreting this Information

- *Data Need to be Much More Consistent/Much Additional Data Needed*
See "Plans to Improve this Data Layer" for details.
- *Existing inventories of acreage change are national in scope and designed to provide information on national wetlands losses and gains by wetland type. They were not designed to track wetland change on a watershed basis and, in most cases, do not provide robust State or watershed information*
- *NWI and NRI were designed to answer different questions and have different sampling procedures. NRI data used in this analysis were adjusted to reflect differences and to account for some changes in NRCS's data collection methods. Unlike the other 14 IWI data layers, this data is reported at the 6 digit accounting unit scale (each 6 digit unit contains several 8 digit units), which IWI interpolated to the 8 digit area*

Plans to Improve this Data Layer

1. U.S. EPA is working towards reporting on both the quantity and quality of wetlands. However, wetland biological monitoring programs are still in their infancy. As States establish wetland monitoring programs and include this information in their 305(b) reports, better data will be available for this data layer
2. U.S. EPA is continuing to work with the USFWS and NRCS to monitor wetland loss and report improvements in wetland acreage. The Federal Geographic Data Committee Wetlands Subcommittee is exploring new approaches of tracking wetland acreage, reporting more frequently, and reporting at the 8-digit watershed level

For More Information Contact:

Database Owners:

1. NRI: USDA National Resources Conservation Service (NRCS)
2. NWI: U.S. Fish and Wildlife Service (USFWS)

Individual Contacts:

NRI: Bob Kellogg	NWI: Tom Dahl
E-mail: rkellogg@nhq.nrcs.usda.gov	E-mail: Tom_Dahl@mail.fws.gov
Phone: (202) 690-0341	Phone: (813) 570-5429

Data Source:

1. Natural Resources Inventory (NRI), 1982 and 1992
2. National Wetlands Inventory (NWI), 1780s-1980s

Additional Information

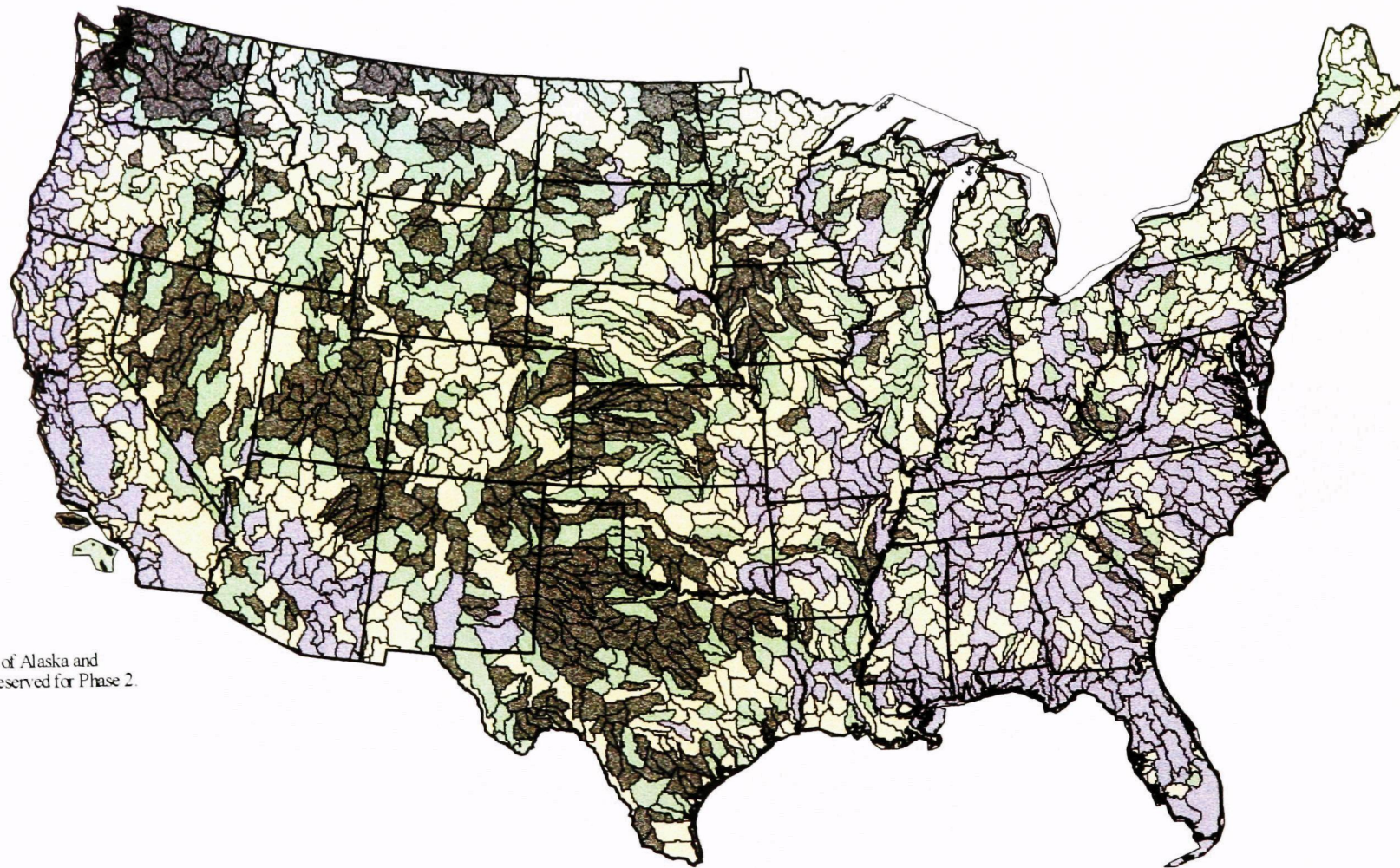
For information about wetlands, contact:

EPA Wetlands Information Hotline (contractor operated)
1-800-832-7828 or <http://www.epa.gov/OWOW/wetlands/wetline.html>

For additional information about the wetlands data layer, contact:





Tom Danielson, U.S. Environmental Protection Agency Wetlands Division
E-mail: Danielson.Tom@epamail.epa.gov Phone (202) 260-5299

8. Aquatic/Wetland Species at Risk 1996



Analysis of Alaska and
Hawaii reserved for Phase 2.

Watershed Record

-  1 Species Known to be at Risk
-  2 - 5 Species Known to be at Risk
-  >5 Species Known to be at Risk
-  No Recorded Data

Index of Watershed Indicators

Sources: State Natural Heritage Data Centers
The Nature Conservancy



Map 8

Importance of Aquatic/Wetland Species at Risk

This data layer provides information about the presence of species at risk in a given watershed. The State agency-based Natural Heritage Network and The Nature Conservancy (TNC) assess the conservation status of plants and animals, and map out the population occurrences of those species at greatest risk of extinction. This indicator represents the number of aquatic or wetland-dependent species documented in a watershed that are classified by the Heritage Network as critically imperiled (identified by TNC as G1), imperiled (G2), or vulnerable (G3), or that are listed under the federal Endangered Species Act (ESA) as threatened or endangered.

The presence of rare or endangered species in a watershed is not necessarily an indication of poor watershed conditions. Indeed, it more likely indicates the opposite: in many instances these species persist only in areas of exceptionally high quality habitat. The presence of species at risk in a watershed indicates, however, that these watersheds are especially vulnerable to future water quality or habitat degradation, which could jeopardize the maintenance or recovery of these organisms. Watersheds considered vulnerable because of the presence of species at risk may require special attention to protect or restore water quality in order to maintain these biological values.

Access to Detailed Data

Access to detailed data for each data layer is available through "Surf Your Watershed" at: <http://www.epa.gov/surf/IWI/data> Click on the data layer of interest to find documentation and FTP (File Transfer Protocol) addresses.

Access to detailed data on the species at risk documented within a given watershed should be requested through the relevant State Natural Heritage Data Center. Contact information for the 48 State programs that provided data to the Index of Watershed Indicators can be accessed at <http://www.heritage.tnc.org/nhp/directory/dirlist.html>.

Data Sufficiency Thresholds

The presence of an individual species in a watershed is based on the existence in the heritage databases of at least one documented occurrence in that watershed since 1970. Furthermore, occurrences must be geo-referenced at a precision-level of at least one-minute latitude/longitude. This map includes only species that meet the following two criteria for status and habitat use: 1) Heritage/Conservancy conservation status of critically imperiled to vulnerable (G1-G3), or federal ESA status of threatened or endangered; and 2) dependent on aquatic or wetland habitats based on selection criteria developed as part of the U.S. EPA *Environmental Indicators of Water Quality in the United States* report.

Notes on Interpreting this Information

- *Data Need to be Much More Consistent/Much Additional Data Needed*
See "Plans to Improve this Data Layer" for details.
- *State Natural Heritage Data Centers process data according to consistent inventory and data management standards, producing information that is comparable from State to State.*
- *Aquatic inventory efforts and data processing backlogs, however, vary from State to State. Thus while available data is comparable, level of data completeness is inconsistent.*
- *Heritage species occurrence data are not based on comprehensive inventories of each watershed and major inventory gaps remain, especially for aquatic species. For this reason, some watersheds may actually have more species at risk than indicated.*
- *Similarly, lack of data for a watershed cannot be construed to mean that no species at risk are present. It is not currently possible using this data set to distinguish between lack of inventory data for a watershed and the absence of species at risk in that watershed.*

Plans to Improve this Data Layer

Working with U.S. EPA's Office of Information Resources Management, plans are being developed that could improve heritage data consistency among States, reduce data processing backlogs, and create a more readily accessible national element occurrence data set. In the short-term, information could be compiled and mapped for specific groups of organisms (e.g., fish and mussels) to complement the occurrence information available and reduce watershed data gaps on the map.

For More Information Contact:

Database Owners:

State Natural Heritage Data Centers

<http://www.heritage.tnc.org/nhp/directory/dirlist.html>

Data compiled and analyzed by The Nature Conservancy

Individual Contact:

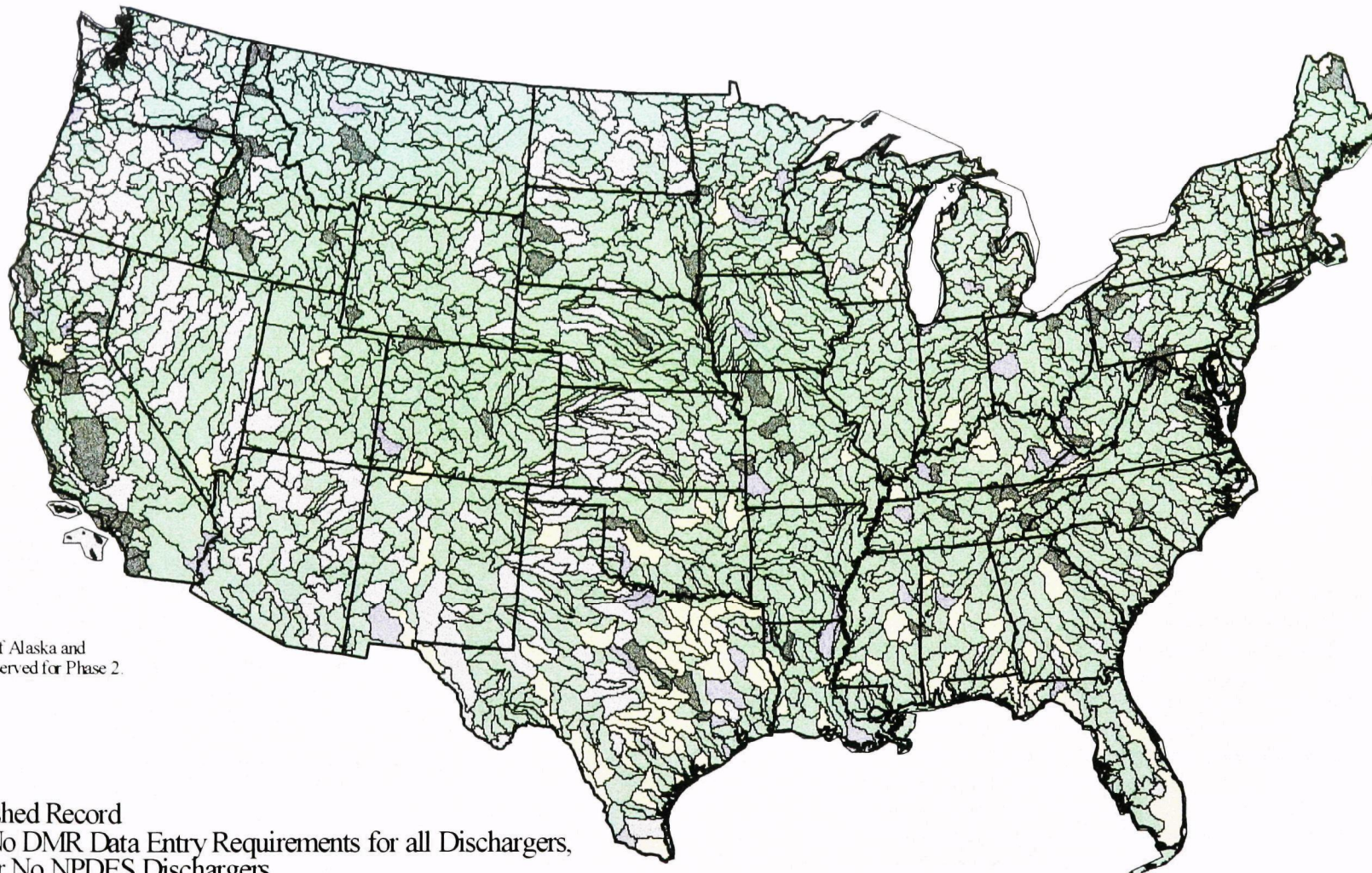
Bruce Stein

E-mail: bstein@tnc.org

Phone: 703-841-2711

The basic locational data underlying this map are developed and stored by the State agency-based Natural Heritage Data Centers. These State data centers document the location of rare and endangered species for use in environmental planning and conservation efforts. Locational data from 48 States were aggregated and combined with conservation status and habitat use information maintained by TNC to develop this map.

9. Pollutant Loads Discharged Above Permitted Limits - Toxic Pollutants 1995



Analysis of Alaska and
Hawaii reserved for Phase 2.

Watershed Record

- No DMR Data Entry Requirements for all Dischargers, or No NPDES Dischargers
- No Aggregate Loads in Excess of Total Permit Limits or No Permitted Dischargers
- Up to 20% Average Load Over Permitted Limits
- More Than 20% Average Load Over Permitted Limits
- Insufficient Data for >10% of Major Dischargers or for >50% of Minor Dischargers when No Major Dischargers Present

Index of Watershed Indicators

Sources: U.S. Environmental Protection Agency
Permit Compliance System



Importance of Pollutant Loads Discharged Above Permitted Limits - Toxic Pollutants

As one of the activities to maintain water quality in the US, the Clean Water Act requires that U.S. EPA or States set limits through permits under the National Pollutant Discharge Elimination System (NPDES) on the amount of pollutants that facilities such as sewage treatment or industrial plants may discharge into a waterbody. Limits for these discharges are set according to national technology-based standards and the conditions of the waters that receive the discharge based on State water quality standards. This data layer adds up the total amount of pollutants allowed to be discharged through NPDES permits into each watershed, and compares this total amount to the total amount of pollutants actually discharged to determine the amount in excess of the allowable discharge.

Watersheds with pollutant loads greater than the total permit limits of all facilities are considered vulnerable to future declines in aquatic health. This data layer provides insight into whether the total of all discharges exceeds the total of all permitted limits for all toxic pollutants named in the permits. Such toxic pollutants include cadmium, copper, lead, mercury, and others. Watersheds with the highest scores have greater potential for possible future environmental decline due to toxic pollutant exceedences.

Access to Detailed Data

Access to detailed data for each data layer is available through "Surf Your Watershed" at: <http://www.epa.gov/surf/IWI/data>. Click on the data layer of interest to find documentation and FTP (File Transfer Protocol) addresses.

Data Sufficiency Thresholds

A watershed was considered to have insufficient data if more than 10% of the major facilities in the watershed did not have Discharge Monitoring Form (DMR) data in the Permit Compliance System (PCS), or, if there were no major facilities, more than 50% of the minor facilities in the watershed did not have DMR data in PCS.

Notes on Interpreting this Information

- *Data Consistent/Sufficient Data Collected (permittees must follow NPDES requirements in reporting data)*
See "Plans to Improve this Data Layer" for details.
- *The discharge data from "Minor" facilities (municipal facilities with flow less than 1 million gallons a day, or non-municipal facilities with a major rating code (a code assigned based on such factors as type of waste, toxicity, flow, and distance from a drinking water source) below the minimum requirement to be classified "Major") are not required to be entered into PCS. Therefore, this data layer may not represent all permitted dischargers in a watershed.*
- *Due to inconsistent reporting of monitoring data below the method detection limit across the country, DMR data below detection were not used in this*

analysis. Facilities that had a mixture of data above and below the detection limit were included in the analysis but only data above detection were used to calculate loadings.

- *Violations of daily maximums, where there are no monthly average limits, were evaluated as 30 days of violation except chlorine, which was calculated as only a one-day violation. This minimizes the impact of chlorine while maximizing the impact of the other toxic pollutants. Due to the frequency at which chlorine is monitored and the probability of a short duration violation, chlorine violations, if treated as 30 days of violation, would significantly mask other toxic pollutant violations which may have more impact on the receiving waterbody (chlorine dissipates quickly while these other toxic pollutants do not).*

Plans to Improve this Data Layer

The data contained in PCS are of high quality, but the Office of Water and the Office of Enforcement and Compliance Assurance are still taking actions to improve the data in order to address: (1) changes in permitting requirements from year to year; (2) inconsistent reporting from facilities required to submit discharge data; (3) facilities not required to report discharge data but still responsible for releasing contaminants to receiving waters; and (4) different PCS parameter codes for the same pollutant. In addition, the U.S. EPA plans to provide guidance to regional and State permit writers on how to enter data more accurately and consistently into PCS.

For More Information Contact:

Database Owner: U.S. EPA, Office of Enforcement and Compliance Assurance
Individual Contact: Steve Rubin E-mail: Rubin.Steven@epamail.epa.gov Phone: (202) 564-7052

Data Source: Permit Compliance System (PCS), U.S. EPA From the 1995 self-monitoring measurement data reported on the NPDES DMR form

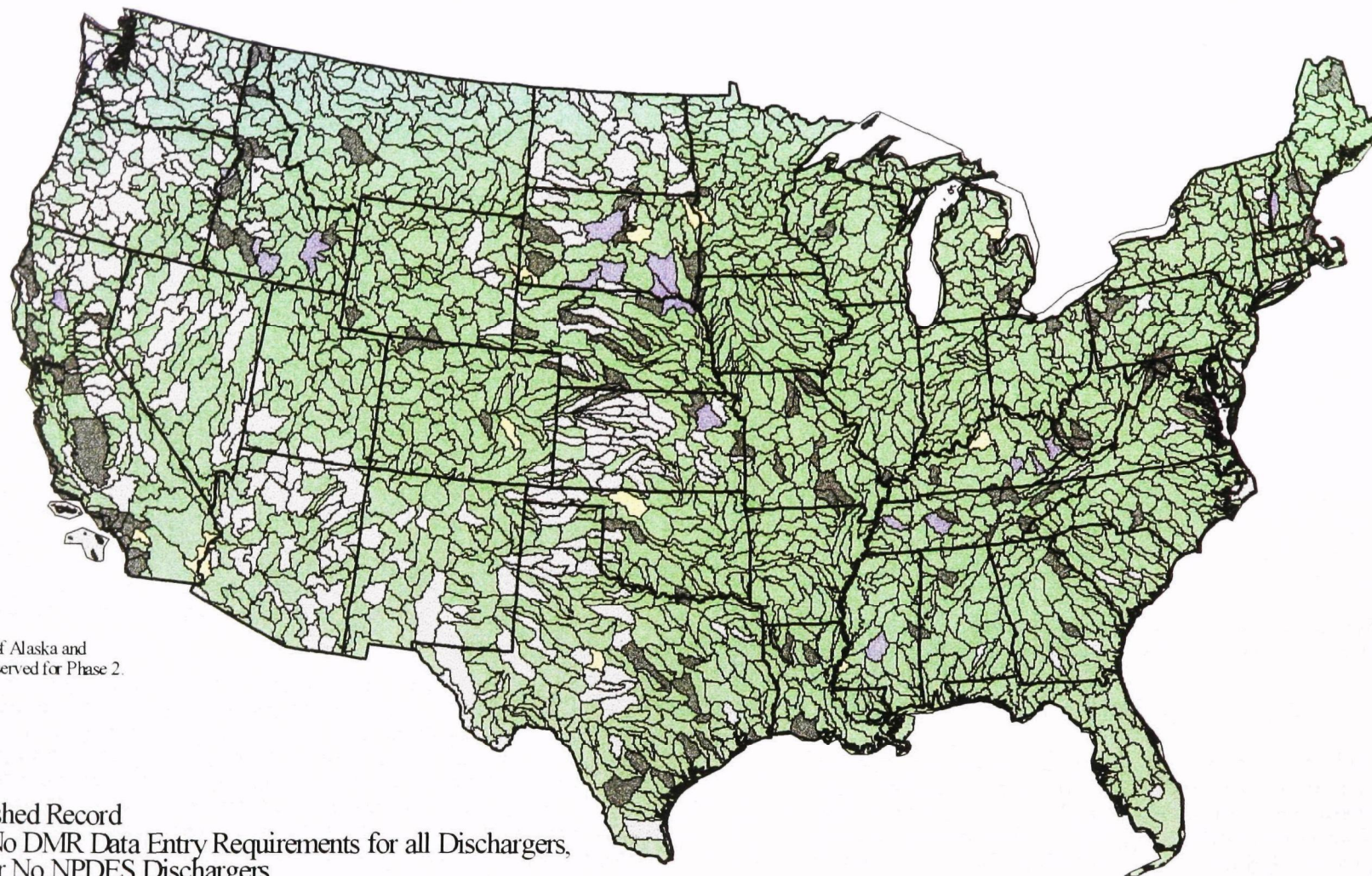
Additional Information

U.S. EPA Regional Contacts

1 - Robin Neas
E-mail: Neas.Robin@epamail.epa.gov
Phone: 617/565-4869
3 - Edna Jones
E-mail: Jones.Edna@epamail.epa.gov
Phone: 215/566-5795
5 - Arnie Leder
E-mail: Leder.Arnold@epamail.epa.gov
Phone: 312/886-0133
7 - Michael Rosenbaum
E-mail: Rosenbaum.Mike@epamail.epa.gov
Phone: 913/551-7450
9 - Carey Houk
E-mail: Houk.Carey@epamail.epa.gov
Phone: 415/744-1886






2 - Roger K. Vann
E-mail: Vann.Roger@epamail.epa.gov
Phone: 212/637-3321
4 - Mike Donehoo
E-mail: Donehoo.Mike@epamail.epa.gov
Phone: 404/562-9745
6 - Cathy Bius
E-mail: Bius.Catherine@epamail.epa.gov
Phone: 214/665-6456
8 - Josie Hernandez
E-mail: Hernandez.Josie@epamail.epa.gov
Phone: 303/312-7079
10 - Jeannine (JJ) Brown
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10. Pollutant Loads Discharged Above Permitted Limits - Conventional Pollutants 1995



Analysis of Alaska and
Hawaii reserved for Phase 2.

Watershed Record

-  No DMR Data Entry Requirements for all Dischargers,
or No NPDES Dischargers
-  No Aggregate Loads in Excess of Total Permit Limits
or No Permitted Dischargers
-  Up to 40% Average Load Over Permitted Limits
-  More Than 40% Average Load Over Permitted Limits
-  Insufficient Data for >10% of Major Dischargers or for >50%
of Minor Dischargers when No Major Dischargers Present

Index of Watershed Indicators

Sources: U.S. Environmental Protection Agency
Permit Compliance System



June 23, 1997

Importance of Pollutant Loads Discharged Above Permitted Limits - Conventional Pollutants

As one of the activities to maintain water quality in the U.S., the Clean Water Act requires that U.S. EPA or States set limits through permits under the National Pollutant Discharge Elimination System (NPDES) on the amount of pollutants that facilities such as sewage treatment or industrial plants may discharge into a waterbody. Limits for these discharges are set according to national technology-based standards and the conditions of the waters that receive the discharge based on State water quality standards. This data layer adds up the total amount of pollutants allowed to be discharged through NPDES permits into each watershed, and compares this total amount to the total amount of pollutants actually discharged to determine the amount in excess of the allowable discharge.

Watersheds with pollutant loads greater than the total permit limits of all facilities are considered vulnerable to future declines in aquatic health. This watershed vulnerability data layer provides insight into whether the total of all discharges by facilities exceeds the total of all permitted limits for all conventional pollutants named in the permits. Such conventional pollutants include biochemical oxygen demand, total suspended solids, nutrients, and others. Watersheds with the highest scores have greater potential for possible future environmental decline due to conventional pollutant exceedences.

Access to Detailed Data

Access to detailed data for each data layer is available through "Surf Your Watershed" at: <http://www.epa.gov/surf/IWI/data>. Click on the data layer of interest to find documentation and FTP (File Transfer Protocol) addresses.

Data Sufficiency Thresholds

A watershed was considered to have insufficient data for this analysis if greater than 10% of the major facilities in that watershed did not have Discharge Monitoring Report (DMR) data in the Permit Compliance System (PCS), or, if there were no major facilities, more than 50% of the minor facilities in that watershed did not have DMR data in PCS.

Notes on Interpreting this Information

- *Data Consistent/Sufficient Data Collected (permittees must follow NPDES requirements in reporting data)*
See "Plans to Improve this Data Layer" for details.
- *The discharge data from "Minor" facilities (municipal facilities with flow less than 1 million gallons a day, or non-municipal facilities with a major rating code (a code assigned based on such factors as type of waste, toxicity, flow, and distance from a drinking water source) below the minimum requirement to be classified "Major") are not required to be entered into PCS. Therefore, this data layer may not represent all permitted dischargers in a watershed.*

- *Due to inconsistent reporting of monitoring data below the method detection limit across the country, DMR data below detection were not used in this analysis. Facilities that had a mixture of data above and below the detection limit were included in the analysis but only data above detection were used to calculate loadings.*
- *Violations of daily maximums, where there are no monthly average limits, were evaluated as 30 days of violation.*

Plans to Improve this Data Layer

The data contained in PCS are of high quality, but the Office of Water and the Office of Enforcement and Compliance Assurance are still taking actions to improve the data in order to address: (1) changes in permitting requirements from year to year; (2) inconsistent reporting from facilities required to submit discharge data; (3) facilities not required to report discharge data but still responsible for releasing contaminants to receiving waters; and (4) different PCS parameter codes for the same pollutant. In addition, the U.S. EPA plans to provide guidance to regional and State permit writers on how to enter data more accurately and consistently into PCS.

For More Information Contact:

Database Owner: U.S. EPA, Office of Enforcement and Compliance Assurance

Individual Contact: Steve Rubin, E-mail: Rubin.Steven@epamail.epa.gov Phone: (202) 564-7052

Data Source

Permit Compliance System, U.S. Environmental Protection Agency
From the 1995 self-monitoring measurement data reported by NPDES Discharge Monitoring Report (DMR) form.

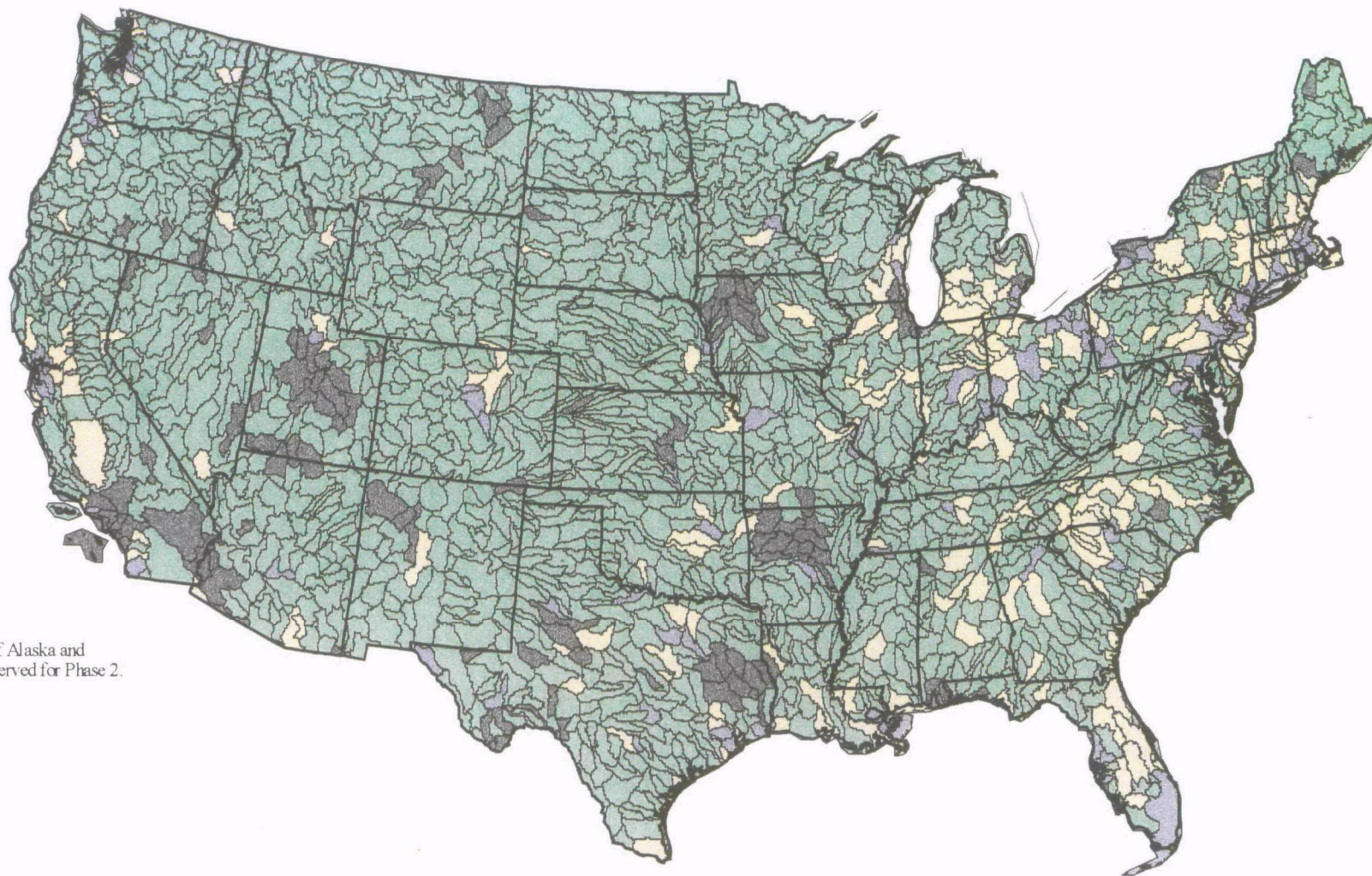
Additional Information

U.S. EPA Regional Contacts:





1 - Robin Neas
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Phone: 617/565-4869
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E-mail: Jones.Edna@epamail.epa.gov
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7 - Michael Rosenbaum
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Phone: 214/665-6456
8 - Josie Hernandez
E-mail: Hernandez.Josie@epamail.epa.gov
Phone: 303/312-7079
10 - Jeannine (JJ) Brown
E-mail: Brown.Jeannine@epamail.epa.gov
Phone: 206/553-1058

11. Urban Runoff Potential 1990



Watershed Estimates

-  $\leq 1\%$ Land Area Above 25% Imperviousness
-  1 - 4% Land Area Above 25% Imperviousness
-  $>4\%$ Land Area Above 25% Imperviousness
-  Insufficient Data to Make Estimates

Index of Watershed Indicators

Sources: U.S. Census Bureau
U.S. Geological Survey



Importance of Urban Runoff Potential

Imperviousness is a useful indicator to predict impacts of land development on aquatic ecosystems. Studies have linked the amount of imperviousness to changes in the hydrology, habitat structure, water quality and biodiversity of aquatic ecosystems (Watershed Protection Techniques, Vol. 1, No. 3, Fall 1994). Increased imperviousness can change the hydrology of a receiving stream, increasing runoff volume and rate and decreasing the receiving streams capacity to handle floods.

Access to Detailed Data

Access to detailed data for each data layer is available through "Surf Your Watershed" at: <<http://www.epa.gov/surf/IWI/data>>. Click on the data layer of interest to find documentation and FTP (File Transfer Protocol) addresses.

Description of the Data Layer

This indicator was developed based on the block group, a geographic area defined by the U.S. Census Bureau for purposes of reporting demographic data. A database of urban area was developed based on the 1978 U.S. Geological Survey (USGS) land use data and estimated population growth from 1978 to 1990. A relationship between population growth and expansion of urban area was established for each block group to estimate the 1990 urban area and imperviousness area for each block group. An urban runoff potential was then calculated for each block group using a simple runoff estimation method based on regional rainfall characteristics and the amount of urban and imperviousness area. This urban runoff potential was then aggregated at the 8-digit watershed level to determine an urban runoff potential indicator for the Index of Watershed Indicators.

Data Sufficiency Thresholds

All block group data were used.

Notes on Interpreting this Information

- *Data Somewhat Consistent/Additional Data Needed*
See "Plans to Improve this Data Layer" for details.
- *Indicator represents 1990 urban conditions. Changes since 1990 are not reflected.*
- *The relationship developed to estimate 1990 urban area and imperviousness area may not accurately reflect current conditions.*
- *Stormwater management practices are not included in the determination of the indicator. These practices, if properly designed and maintained, can mitigate impacts caused by imperviousness.*

Plans to Improve this Data Layer

Plans to be determined.

For More Information Contact:

Database Owner:

U.S. Environmental Protection Agency, Office of Water

Individual Contact:

John Kosco

E-mail: Kosco.John@epamail.epa.gov

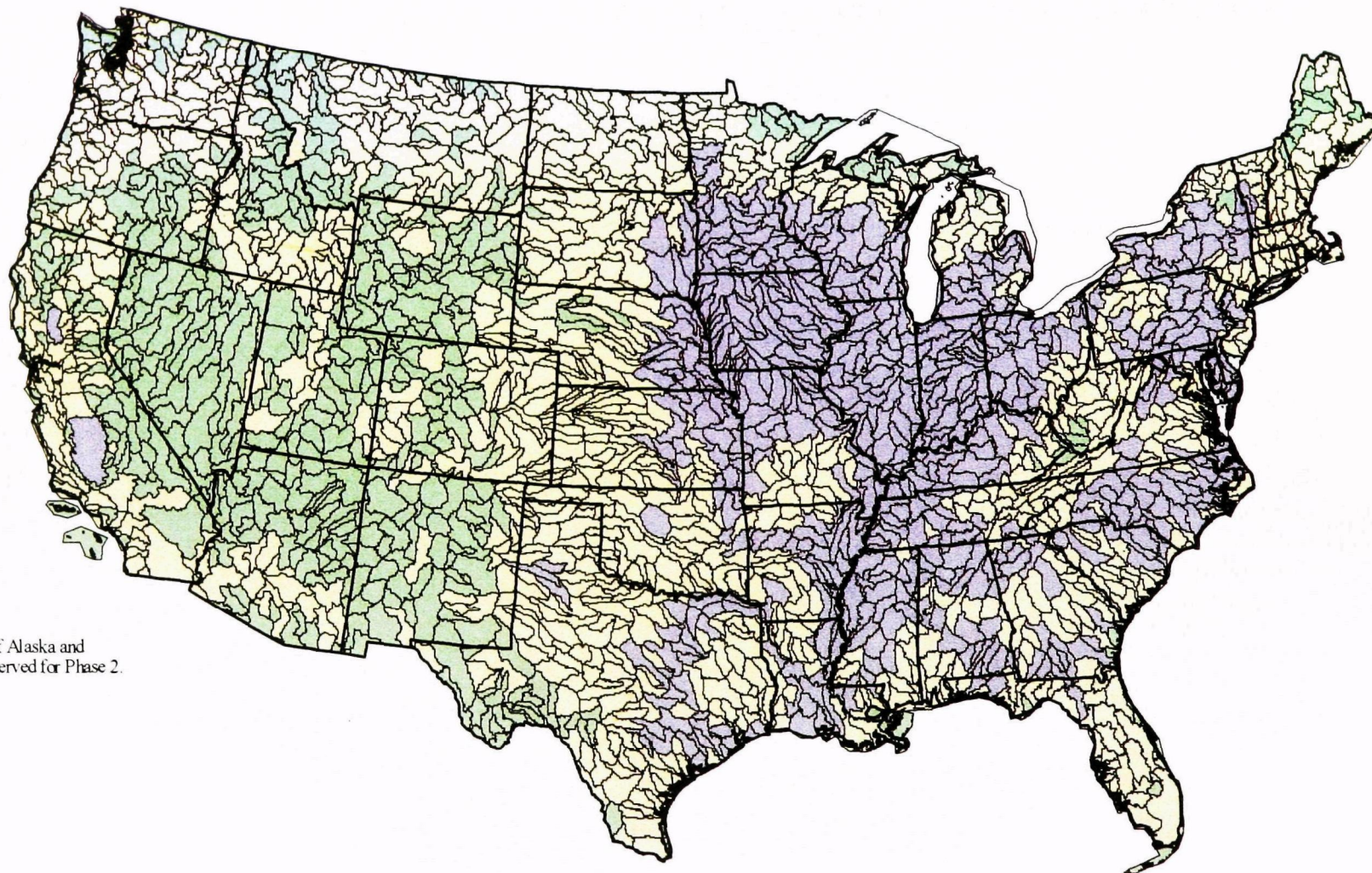
Phone: 202 260-6385

Data Source:

U.S. Census Bureau - 1990 population and housing, 1980 population





U.S. Geological Survey - GIRAS Land Use, 1978

12. Index of Agricultural Runoff Potential (Based Upon Nitrogen, Sediment and Pesticide) 1990 - 1995



Analysis of Alaska and
Hawaii reserved for Phase 2.

Watershed Classification

-  Low Level of Potential Impact
-  Moderate Level of Potential Impact
-  High Level of Potential Impact
-  Insufficient IWI Data

Index of Watershed Indicators

Source: Natural Resources Conservation Service



Importance of Index of Agricultural Runoff Potential

A composite index was constructed to show which watersheds had the greatest potential for possible water quality problems from combinations of pesticides, nitrogen, and sediment. Watersheds with the highest composite score have a greater risk of water quality impairment from agricultural sources than watersheds with low scores. Watersheds could be ranked high because of a very high ranking of a single component, or moderately high rankings from two or more components.

Access to Detailed Data

Access to detailed data for each data layer is available through "Surf Your Watershed" at: <http://www.epa.gov/surf/IWI/data> Click on the data layer of interest to find documentation and FTP (File Transfer Protocol) addresses.

Description of the Data Layer

The composite indicator was constructed by ranking watersheds for each of the three components -- potential pesticide runoff, potential nitrogen runoff, and potential in-stream sediment loads -- and then summing the rankings for each watershed. This procedure weighted each of the three components equally. Individual maps for the three components are shown in "Supplemental Maps" following

Data Sufficiency Thresholds

No data sufficiency threshold was applied.

Notes on Interpreting this Information

- *Data Consistent/Sufficient Data Collected*
See "Plans to Improve this Data Layer" for details.
- *The composite indicator primarily represents sources of pollutants from cropland. It does not include any components for rangeland, pastureland, or privately managed forest land.*
- *This composite map combines three disparate agricultural vulnerability indicators -- pesticide runoff, nitrogen runoff, and in-stream sediment loads. See the individual data layer maps in "Supplemental Maps" for additional information and caveats for each of these component indicators.*

Plans to Improve this Data Layer

Efforts will be made to include additional vulnerability components for rangeland, pastureland, and forest land.

For More Information Contact:

Database Owner

U.S. Department of Agriculture, NRCS

Individual Contact

Robert Kellogg, NRCS/USDA

E-mail: robert.kellogg@usda.gov

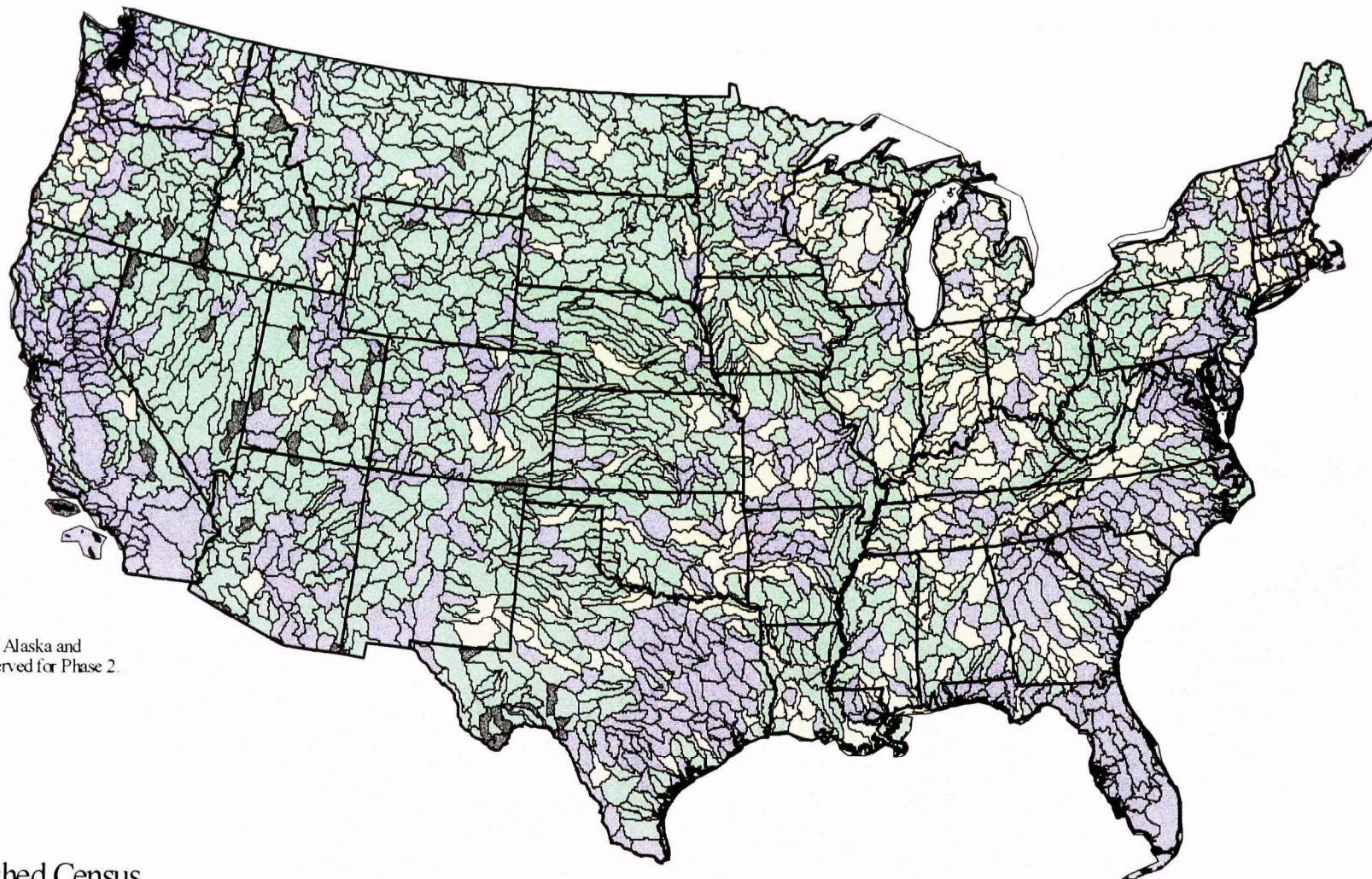
Phone: (202) 690-0341

Data Source:

National Resources Inventory





U.S. Department of Agriculture, Natural Resources Conservation Service

13. Population Change 1980 - 1990



Analysis of Alaska and
Hawaii reserved for Phase 2.

Watershed Census

-  Declined or No Change
-  0 - 7% Increase
-  >7% Increase
-  Insufficient IWI Data

Index of Watershed Indicators

Source: U.S. Census Bureau



Importance of Population Change

The growth of human populations can result in increased pollution of our waters as land cover and land uses change. These changes include construction impacts, increased impervious surfaces, loss of wetlands, and increased sewage flows. Population often increases in areas with growing sources of employment, also bringing industrial and commercial impacts as well. This data layer identifies changes in population in watersheds based on the U.S. Census Bureau data. It assigns scores based on whether the population has remained stable or decreased, increased from 0 to 7%, or increased more than 7%.

Access to Detailed Data

Access to detailed data for each data layer is available through "Surf Your Watershed" at: <<http://www.epa.gov/surf/IWI/data>>. Click on the data layer of interest to find documentation and FTP (File Transfer Protocol) addresses

Data Sufficiency Thresholds

Watersheds with a density of less than 6.88 people per square mile were placed in the category of "declined or no significant change." Density values less than 6.88 represent the 5th quantile and are considered to be so low as to have minimal impact on water quality. Population changes between zero and 7 percent (but with densities greater than 6.88) were placed in the second category, while population changes greater than seven percent were placed in the third category.

Notes on Interpreting this Information

- *Data Consistent/Sufficient Data Collected*
See "Plans to Improve this Data Layer" for details.
- *The calculation of population change was done at the 8-digit Cataloguing Unit level which could mask areas of change in watersheds that have block groups with increasing populations and block groups with decreasing populations*

Plans to Improve this Data Layer

Data will be revised after the next census.

For More Information Contact:

Database Owner

U.S. Census Bureau

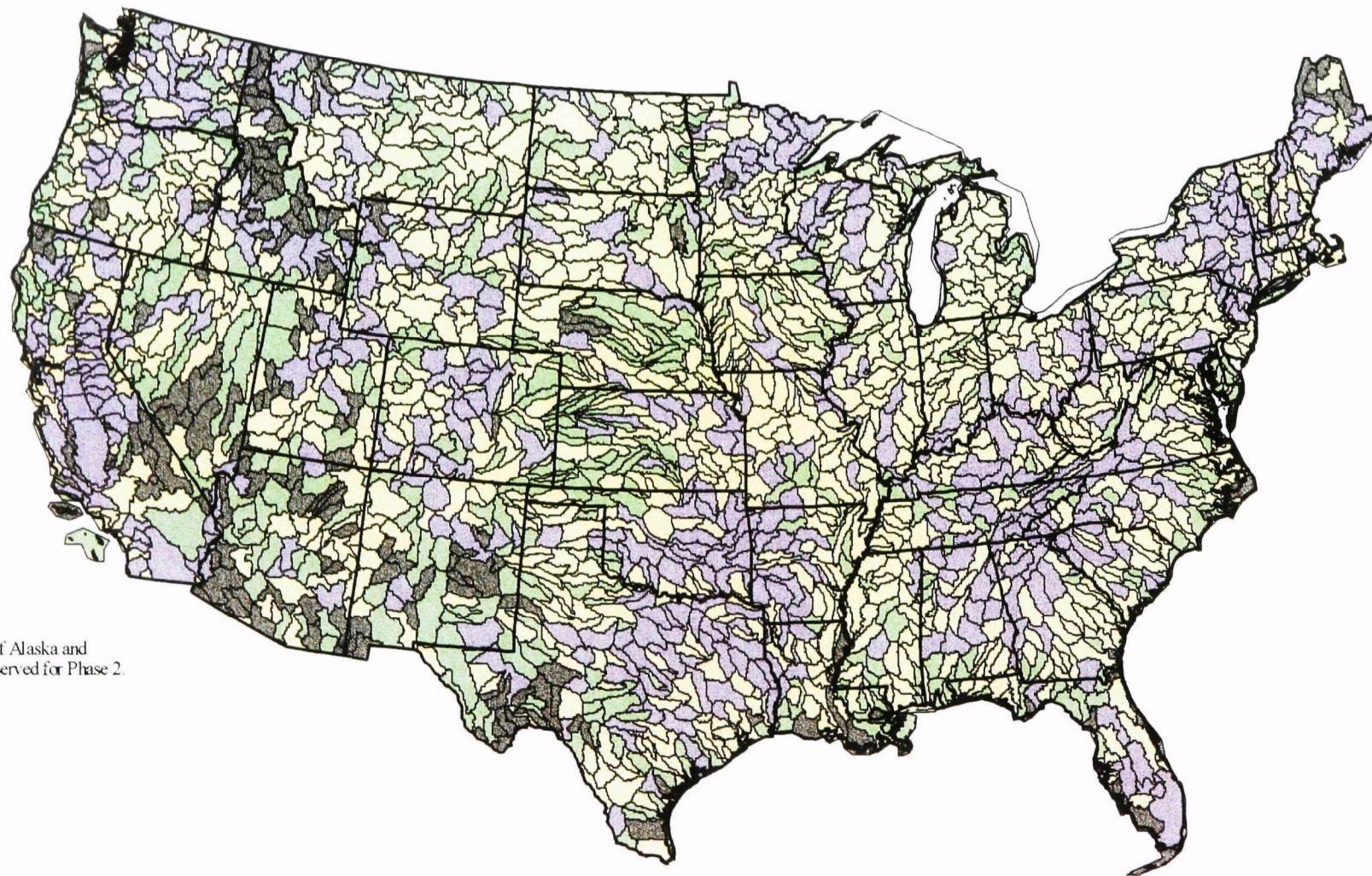
Individual Contact

Tod Dabolt, U.S. EPA
202 260-3697
E-mail: Dabolt.Thomas@epamail.epa.gov

Data Source:





U.S. Census Bureau, 1980-1990.

14. Hydrologic Modification Caused by Dams 1995 - 1996



Analysis of Alaska and
Hawaii reserved for Phase 2.

Watershed Classification

-  Low Volumes of Impounded Water
-  Moderate Volumes of Impounded Water
-  High Volumes of Impounded Water
-  No Recorded Dams

Index of Watershed Indicators

Source: U.S. Army Corps of Engineers



June 27, 1997

Importance of Hydrologic Modification Caused by Dams

The health of the aquatic system in a watershed can be compromised by extensive impoundment or hydrologic modification of water resources. This index shows the relative dam storage capacities in watersheds, which provides a picture of the relative degree of modification of hydrologic conditions in a watershed. This data is used by Federal Emergency Management Agency to assess overall safety hazards posed by dams in the United States. The data can also be used to analyze needs and target resources for navigation, flood control, water supply, hydroelectric power, environmental restoration, wildlife protection, and recreational projects.

This database is an inventory of U.S. dams in excess of six feet in height and a maximum water impounding capacity of at least fifty acre feet; or dams at least twenty-five feet in height and a maximum water impoundment capacity in excess of fifteen acre-feet. It contains information on 75,187 dams throughout the U.S. and its territories. The U.S. Army Corps of Engineers updates the database with assistance from the States and territories

Access to Detailed Data

Access to detailed data for each data layer is available through "Surf Your Watershed" at: <<http://www.epa.gov/surf/IWI/data>> Click on the data layer of interest to find documentation and FTP (File Transfer Protocol) addresses.

Data Sufficiency Thresholds

All data is used for this data layer except that on a river with multiple dams, waters are not counted twice.

Notes on Interpreting this Information

- *Data Somewhat Consistent/Additional Data Needed*
See "Plans to Improve this Data Layer" for details.
- *The database does not reflect actual stream channel modifications.*
- *The database does not reflect the different uses of impounded waters.*

Plans to Improve this Data Layer

EPA intends to deal better with the impacts of small dams, dry dams, and reservoirs. In addition, the Nature Conservancy is developing an Index of Hydrologic Modification that in time may provide more predictions of aquatic resource modification.

For More Information Contact:

Database Owner:

U.S. Army Corps of Engineers

Individual Contact:

Bob Bank

E-mail: Robert.Bank@inet.hq.usace.army.mil

Phone: (202) 761-1660

Data Source:

National Inventory of Dams Database

U.S. Army Corps of Engineers. 1995-199

15. Estuarine Pollution Susceptibility Index Based Upon Pollution Loads and Pollution Retention Characteristics of Estuaries 1989 - 1991



Analysis of Alaska and
Hawaii reserved for Phase 2.

Coastal Watershed Classification

Low Susceptibility
Moderate Susceptibility
High Susceptibility

Index of Watershed
Indicators

Source: National Oceanic and Atmospheric Administration



June 22, 1997

The Importance of Estuarine Pollution Susceptibility Index

Coastal lands comprise approximately 11 percent of the area of the United States; however, this area contains nearly 45 percent of the population. Indications are that coastal population growth will continue to increase. As these areas come under increased stress, better information will be required in order to initiate effective management strategies. The Estuarine Pollution Susceptibility Index provides a tracking method for the susceptibility to pollution of coastal watersheds. Susceptibility is defined as the relative vulnerability of an estuary to concentrations of dissolved and particulate substances.

Access to Detailed Data

Access to detailed data for each data layer is available through "Surf Your Watershed" at: <http://www.epa.gov/surf/IWI/data>. Click on the data layer of interest to find documentation and FTP (File Transfer Protocol) addresses.

Description of the Data Layer

National Oceanic and Atmospheric Administration (NOAA) built the National Estuarine Inventory (NEI) around a watershed-based spatial framework which defined and characterized the nation's estuarine resource base in an effort to develop a national estuarine assessment capability. The NEI framework was included in a larger Coastal Assessment Framework (CAF) which identifies all watersheds associated with the coast. The CAF framework data includes a set of approximately 700 cataloging units which are used with geographic information systems to conduct a variety of spatial analyses. NOAA then applied to these 700 cataloging units a Strategic Assessment for Near Coastal Waters which quantifies susceptibility to pollution by the dissolved concentration potential (DCP), the particle retention efficiency (PRE), and by the estimated loadings and predicted concentrations of nitrogen (N) and phosphorus (P).

The DCP characterizes the effect of dilution and flushing on a per-unit-load of a dissolved and conservative pollutant to an estuary. The parameter is based on the fractional freshwater method for predicting the concentration of a pollutant. The DCP used in conjunction with estimated nutrient loads provides a first order approximation of nutrient conditions within an estuary. The PRE is based upon an empirical relationship between sediment trapping efficiency and a capacity to inflow ratio. The PRE assumes that the relative ability of an estuary to trap sediment correlates to its ability to retain any associated toxic pollutant.

Currently, NOAA assessments exist for over 130 estuaries within the CAF. The date for most assessments is 1990, however, the mid-Atlantic and south Atlantic were updated in 1996. To develop the Index of Watershed Indicators (IWI) data layer, information from the CAFs was applied to the 150 U.S. Geological Survey (USGS) cataloging units of the coastal United States and appropriate scores were assigned.

Data Sufficiency Threshold

All NOAA assessments were used.

Notes on Interpreting this Information

- *Data Consistent/Sufficient Data Collected*
See "Plans to Improve this Data Layer" for details.
- *There are some boundary discrepancies between a few USGS units used in the IWI assessment and the Coastal Assessment Framework.*

Plans to Improve this Data Layer

- Replacing the 22.25 km oceanic boundary with a 12 nautical mile Territorial Sea and Contiguous Zone boundary;
- Revising some of the boundaries that define the CAF drainage areas to match the USGS Cataloging units;
- Replacing international boundaries;
- Adding Canadian drainage boundaries;
- Correcting errors based upon user comments.

For More Information Contact:

Database Owner

National Oceanic and Atmospheric Administration

Individual Contact:

NOAA: C. John Klein

E-mail: Jklein@seamail.nos.noaa.gov

Phone: 301-713-3000 ext. 160

U.S. EPA: Greg Colianni

E-mail: Colianni.Gregory@epamail.epa.gov

Phone: 202-260-4025

Data Source:

1. Coastal Assessment Framework. Digital boundary files. National Oceanic and Atmospheric Administration (NOAA), 1990.
2. National Coastal Pollution Discharge Inventory. NOAA/NOS. Unpublished data.
3. Strategic Assessment for Near Coastal Waters. NOAA. (Separate Reports)
 - A. Susceptibility and Status of North Atlantic Estuaries to Nutrient Discharges. NOAA/U.S. Environmental Protection Agency (U.S. EPA). 1989.
 - B. Susceptibility and Status of South Atlantic Estuaries to Nutrient Discharges. NOAA/U.S. EPA. 1989.
 - C. Susceptibility and Status of Gulf of Mexico Estuaries to Nutrient Discharges. NOAA/U.S. EPA. 1989.
 - D. Susceptibility and Status of West Coast Estuaries to Nutrient Discharges. NOAA/U.S. EPA. 1989.
4. National Estuarine Inventory: Physical and Hydrologic Characteristics. NOAA Unpublished Data

Index of Watershed Indicators Phase 2 - Plans for the Future

The information contained in this publication presents the first nationwide index representing the condition and vulnerability of water quality in the watersheds of the continental United States. In Phase 2 of the Index of Watershed Indicators, we will be improving the information for the 15 indicators, and adding additional indicators we were not able to include during Phase 1. Phase 2 begins in Summer 1997 and will work to include information on:

Geographic Areas

- Add Alaska and Hawaii
- Add specific information for Native American lands
- Add information about Federally-owned lands
- Work with USGS to correct Cataloguing Unit problems uncovered during the IWI process such as duplicative watershed names and boundary issues, work with NOAA to correct remaining inconsistencies between NOAA's Coastal Assessment Framework and USGS's Cataloguing Units.

Add Additional Indicators

- Biological integrity
- Habitat
- Groundwater
- Coastal condition (eutrophication and shellfish contamination)
- Air deposition

Natural Processes

- Take account of downstream effects, to capture where a watershed is simply exporting its pollution downstream to another watershed

Surf Your Watershed

- Continue to add additional information to the Internet program "Surf Your Watershed." Users are encouraged to add data to "Surf" so it can serve as the electronic index to all available water quality information (the Internet address is: <http://www.epa.gov/surf>).

Partners

- Work with data owners and other partners to correct problems identified during the review period that were not addressed during Phase I (e.g. missing reservoirs in Hydrologic Modification indicator), and add data to both IWI and "Surf Your Watershed"

Monitoring and Information Management

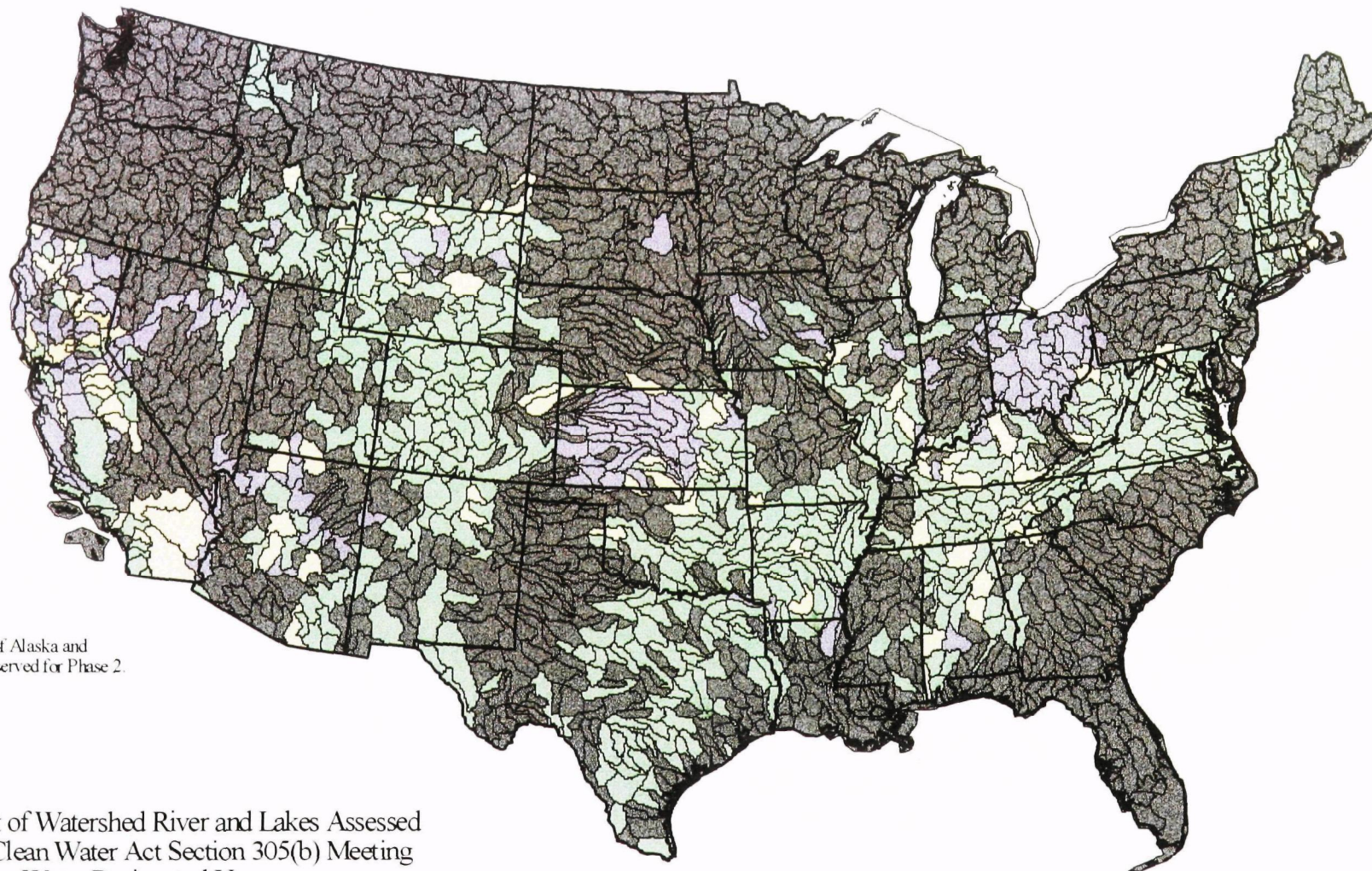
- Work with partners to strengthen monitoring and information management systems that supply data for the Index. The National Water Quality Monitoring Council (formerly the Intergovernmental Task Force on Monitoring Water Quality) will be a key partner in this effort.

Supplemental Maps

Three of the Index of Watershed Indicators data layers -- Map 3: Indicators of Source Water Condition for Drinking Water Systems, Map 7: Wetland Loss Index 1780 - 1980; 1982 - 1992, and Map 12: Index of Agricultural Runoff Potential -- are aggregates of other maps, each included here as supplemental maps.

Other IWI data layers are also aggregates of information. Readers are urged to review the Internet site "Surf Your Watershed" (<http://www.epa.gov/surf>) to see the data that was used in making each of the maps in the Index of Watershed Indicators.

3a. Rivers and Lakes Supporting Drinking Water Uses 1994/1996



Analysis of Alaska and
Hawaii reserved for Phase 2.

Percent of Watershed River and Lakes Assessed
under Clean Water Act Section 305(b) Meeting
Drinking Water Designated Uses

- 80 - 100% Meet Drinking Water Use
- 50 - 79% Meet Drinking Water Use
- <50% Meet Drinking Water Use
- Insufficient Assessment Coverage,
or No State Drinking Water Use Designated

Index of Watershed Indicators

Source: U.S. Environmental Protection Agency



June 20, 1997

Map 3a

Importance of Rivers and Lakes Supporting State Drinking Water Uses

The drinking water use assessments provided by the States under the Clean Water Act's Section 305(b) are one of the three data sets used to characterize source water condition. Water Quality Standards adopted by the states include both designated uses and criteria to protect those uses. Drinking water is one of the uses that can be protected. States and Tribes describe water quality in terms of a waterbody either fully supporting, threatened, partially supporting, or not supporting the drinking water designated use.

The percent of assessed waterbodies in a watershed meeting their drinking water designated use is a partial proxy for the condition of the source waters used by drinking water systems. It is an indicator of how well drinking water uses are protected by surface and ground water quality standards promulgated through the Clean Water Act. Section 305(b) designated use assessments cannot, however, represent the full source water assessments authorized by the Safe Drinking Water Act Amendments of 1996.

Access to Detailed Data

Access to detailed data for each data layer is available through "Surf Your Watershed" at: <http://www.epa.gov/surf/IWI/data>. Click on the data layer of interest to find documentation and FTP (File Transfer Protocol) addresses.

Data Sufficiency Thresholds

Any data reported by States in their 305(b) reports were used in assessing drinking water use support.

Notes on Interpreting this Information:

- *Data Somewhat Consistent/Additional Data Needed*
See "Plans to Improve this Data Layer" for details.
- *The data set containing State assessments for drinking water use is incomplete either because some States did not designate or assess their waters for drinking water use, or they assumed that other uses that were assessed served as surrogates for drinking water use attainment.*

- *Drinking water assessments are inconsistent across states. States and Tribes do not have identical water quality standards or identical methods or criteria to assess their waters.*
- *Most States and Tribes do not assess all of their waters during the two-year reporting period, and they may even modify techniques used or assess different waters every two years.*

Plans to Improve this Data Layer

EPA has several initiatives underway to improve the quality of the 305(b) data to assess drinking water use:

- EPA is working with States, Tribes, other federal agencies, and other partners to develop a more consistent approach to assessing both ground waters and surface waters for drinking water use.
- EPA is also working with its partners to achieve comprehensive coverage of the waters in the nation in the 305(b) report, and include annual electronic updates of key data elements
- This indicator will be updated using the 1996 and subsequent database updates as they become available

For More Information Contact:

Database Owner:

US EPA, Office of Wetlands, Ocean and Watersheds

Individual Contact:

Carl Reeverts; E-mail: Reeverts.Carl@epamail.epa.gov

Phone: (202) 260-7273

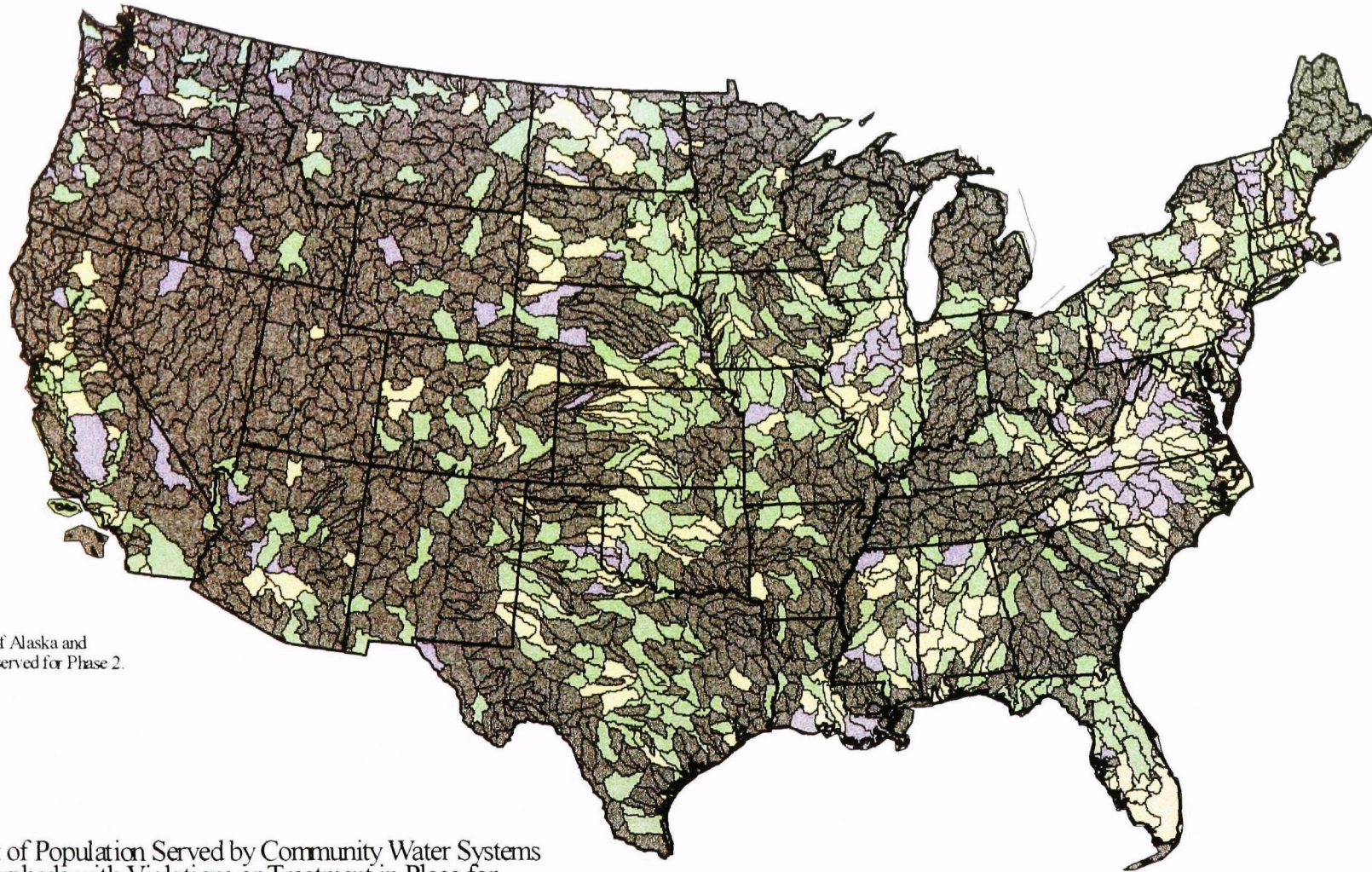
Data Source:

1. National Water Quality Inventory: 1994 Report to Congress
U.S. Environmental Protection Agency, Office of Water
Washington, D.C. December 1995. EPA 841-R-95-005
2. Waterbody System, 305(b) Cataloguing Unit Dataset, Version 1.0
U.S. EPA, Office of Water. 1994, 1996

Additional Information

For additional information on specific state 305(b) reports contact U.S. EPA's Barry Burgan at (202) 260-7060.

3b. Surrogates of Source Water Condition 1991 - 1996



Analysis of Alaska and
Hawaii reserved for Phase 2.

Percent of Population Served by Community Water Systems
in Watersheds with Violations or Treatment in Place for
Chemical Contaminants

- 0 - 10% of Population Served by Community Water Systems
- 11 - 50% of Population Served by Community Water Systems
- >50% of Population Served by Community Water Systems
- Data Sufficiency Threshold Not Met

Index of Watershed Indicators

Source: U.S. Environmental Protection Agency
Safe Drinking Water Information System



Importance of Surrogates of Source Water Condition

Safe Drinking Water Information System (SDWIS) surrogate indicators provide one of the three data sets used to characterize source water condition Map 3. Water systems are major users of the water resources and have a continual interest in the quantity and quality of their water supplies. Source water characterizations prompt water systems to take corrective actions to prevent or respond to violations (including adding additional treatment) to ensure that the water provided at the tap to consumers meets all drinking water standards. Indicators developed from the existing SDWIS water system inventory and violation data are used to flag situations where water systems have or will take actions because of actual or threatened source water problems. Actions taken by water systems can be a good *surrogate* for source water characteristics that may not be identified through other data sources.

Two indicators were developed from SDWIS data:

- a) Population served by Community Water Systems that reported one or more violations of national health-based drinking water standards during FY 1991 - FY 1996 for chemical (not microbiological) contaminants that are source related (i.e. inorganic chemicals, volatile organic chemicals, synthetic organics, and radio-nuclides);
- b) Population served by Community Water Systems that have treatment in place in 1996 to remove chemical (not microbiological) contaminants that are source water-related.

Access to Detailed Data

Access to detailed data for each data layer is available through "Surf Your Watershed" at: <http://www.epa.gov/surf/IWI/data>. Click on the data layer of interest to find documentation and FTP (File Transfer Protocol) addresses.

Data Sufficiency Thresholds

The drinking water data will be considered sufficient to characterize the watershed only where the population served by community water systems is greater than 50 percent of the population that resides in the watershed. Community water systems reporting no chemical violations or treatment in place for chemical contaminants were not included in the source water assessment (see "Notes on Interpreting this Information")

Notes on Interpreting this Information

- *Data Somewhat Consistent/Additional Data Needed*
See "Plans to Improve this Data Layer" for details.
- *Water systems with violations of microbiological standards or treatment to address microbiological contaminants are not included in this data set.*
- *The use of violations data from SDWIS as a surrogate indicator to characterize source water condition has limitations:*
 - *Absence of a violation is not to be construed as a statement on the quality of the source waters (i.e., water systems will take whatever actions necessary to comply with drinking water standards at the tap);*
 - *Violations may be the result of water purchased outside the watershed or*

otherwise unrepresentative of watershed quality (e.g., from a confined aquifer)

- *The use of treatment objective data from SDWIS as a surrogate indicator to characterize source water condition has limitations:*
 - *SDWIS data on treatment objectives is not currently a required State reporting item and is therefore very incomplete, subject to different interpretations by the States, and potentially of lower quality than required elements;*
 - *Absence of data showing treatment for source water-related contaminants is not to be construed as a statement on the quality of the source waters because the data from SDWIS is known to be incomplete.*

Plans to Improve this Data Layer

- 1) SDWIS is undergoing a major modernization effort to improve data entry and retrieval and to broaden the accessibility of SDWIS data to new and different users.
- 2) On-going data quality initiatives will continue to improve the quality of data in SDWIS.
- 3) The data reported into SDWIS by the states is undergoing a review by an ongoing Data Sharing Committee to better meet the need of users.

For More Information Contact:

Database Owner:

U.S. Environmental Protection Agency, Office of Ground Water and Drinking Water

Individual Contact

Carl Reeverts

202 260-7273

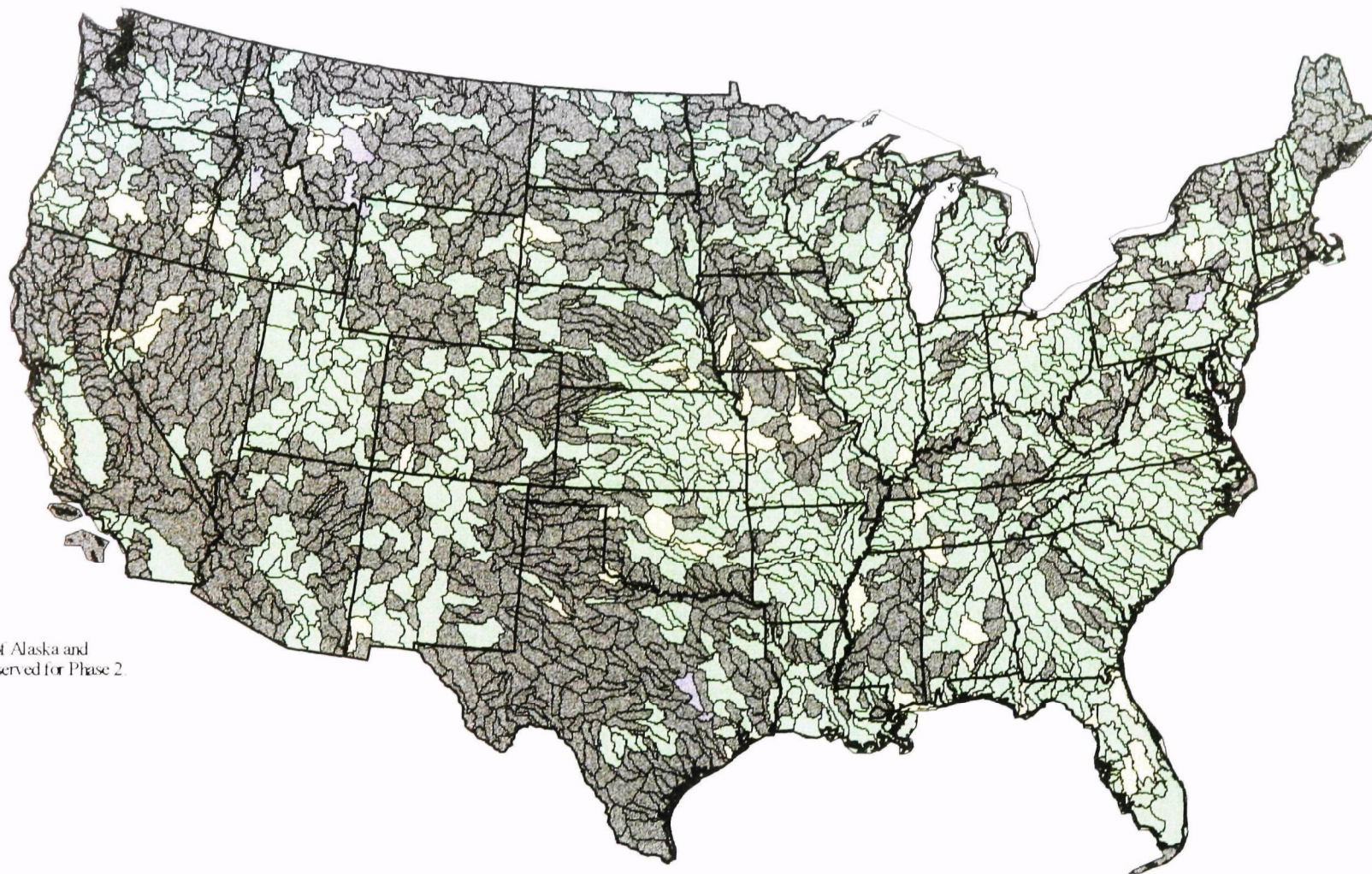
E-mail: Reeverts.Carl@epamail.epa.gov

Data Source:

Extract from the *Safe Drinking Water Information System (SDWIS)*, 1996.





SDWIS is a repository of information on the public water systems regulated by EPA and the States under the Safe Drinking Water Act. Information on public water systems inventory and violations, as well as State and EPA enforcement actions, are reported by States to SDWIS on a quarterly basis. SDWIS information is used by EPA Headquarters and Regions to support implementation and enforcement of the drinking water program. It is also used to characterize progress of the regulatory program and the effectiveness in terms of public health protection of the regulations. SDWIS is the major source of information for the Agency environmental indicators initiatives related to drinking water.

3c. Occurrence of Chemicals in Surface and Ground Waters that are Regulated in Drinking Water 1990-1995



Analysis of Alaska and
Hawaii reserved for Phase 2.

Watershed Classification

-  <5% of Samples that Exceed Half of MCL Levels
-  5 - 25% of Samples that Exceed Half of MCL Levels
-  >25% of Samples that Exceed Half of MCL Levels
-  Insufficient Data

Index of Watershed Indicators

Source: U.S. Environmental Protection Agency



Importance of Occurrence of Chemicals in Surface and Ground Waters That Are Regulated In Drinking Water

Occurrence of contaminants regulated under the Safe Drinking Water Act in (untreated) ambient waters is one of the three data sets used to characterize source water condition in watersheds. EPA maintains a national database, the STORage and RETrieval (STORET) system, containing over 250 million observations of water quality monitoring data from multiple sources both public and private, including the U.S. Geological Survey's National Water Quality Assessment (NAWQA) data which has been added to the STORET system.

This data set includes sampling results in STORET from both surface water and ground water points for all the chemical contaminants regulated under the Safe Drinking Water Act. (See list of contaminants and their Maximum Contaminant Levels (MCLs) in the more detailed Data Profile for this data layer available on Internet at the address below.) The source of the data was limited to that provided by STORET from 1990-1995. Observations above 50% of the MCL were summed for each watershed.

The percent of samples that exceed half of the MCL levels indicate the adequacy with which drinking water may be protected by surface and ground water quality standards.

Access to Detailed Data

Access to detailed data for each data layer is available through "Surf Your Watershed" at <http://www.epa.gov/surf/IWI/data>. Click on the data layer of interest to find documentation and FTP (File Transfer Protocol) addresses.

Data Sufficiency Thresholds

Each watershed must contain at least 5 observations representing a minimum of five sites over the six year period, 1990-1995.

Notes on Interpreting this Information

- *Data Somewhat Consistent/Additional Data Needed*
See "Plans to Improve this Data Layer" for details
- *Data were watershed-wide and not specifically related to source waters used by water systems, therefore, this data should not be used to pinpoint actual source water impairment in the watershed.*
- *The current STORET system contains limited information regarding data quality and STORET users do not necessarily use identical methods or criteria to assess their waters.*

- *Most monitoring undertaken by States and Tribes is focused on rivers, lakes and estuaries with suspected or identified pollution problems. Assessments based on this type of monitoring may not be representative of the whole watershed and may overestimate the degree of concern.*
- *STORET data is incomplete and may misrepresent the occurrence of these contaminants in the watershed. Many States have more complete data on ambient water quality for these contaminants.*

Plans to Improve this Data Layer

- EPA is modernizing STORET to make it easier to access data; store information about data quality and equipment used to acquire the data; and expand the fields to store biological and habitat data.
- EPA will look into using information from the National Drinking Water Occurrence Database (NOCD) when it becomes available in August 1999. It will contain information on the occurrence of both regulated and unregulated contaminants in public waters systems.

For More Information Contact:

Database Owner: U.S. Environmental Protection Agency, Office of Water

Individual Contact:

Louis Hoelman

E-mail: Hoelman.Louie@epamail.epa.gov

Phone: 202 260-7050

Data Source:

STORage and RETrieval System (STORET), 1990-1995

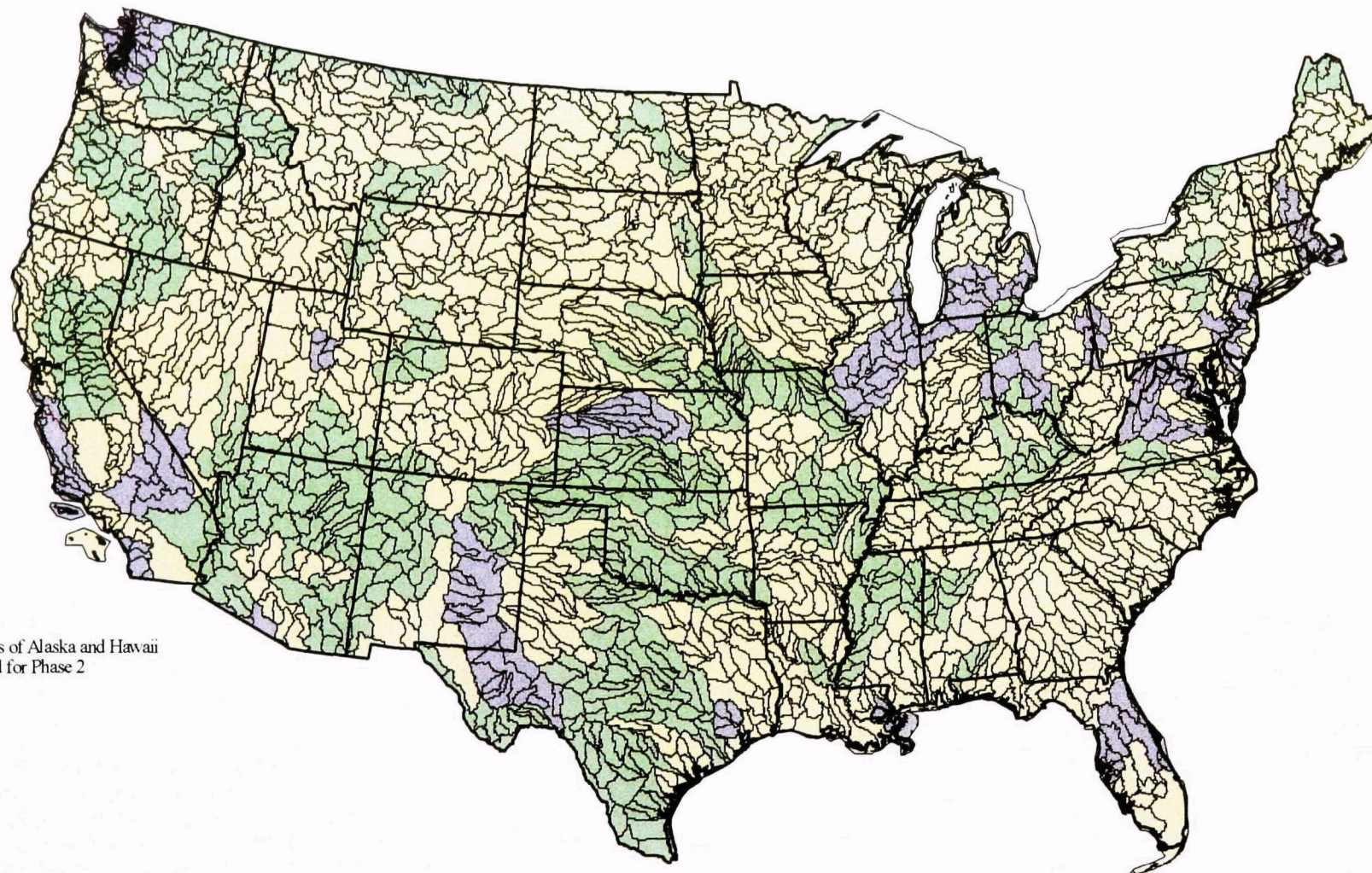
U.S. Environmental Protection Agency, Office of Water.

STORET is designed to collect and disseminate basic information on chemical, physical and biological quality of the nation's waters. It is a repository of water quality data, including information from ambient, intensive survey, and effluent water quality monitoring of the waterways within and contiguous to the U.S.

Additional Information




For additional information on STORET or data in STORET, call the STORET hotline at 1-800-424-9067.

7a. Wetland Loss Measured by the Natural Resources Inventory 1982 - 1992



Analysis of Alaska and Hawaii
reserved for Phase 2

Watershed Classification

-  Low Level of Wetland Loss
-  Moderate Level of Wetland Loss
-  High Level of Wetland Loss

Index of Watershed Indicators

Sources: Natural Resources Conservation Service

Map 7a

Importance of Wetland Loss Measured by the NRI

Wetlands make important contributions to the health of aquatic systems on a watershed basis by purifying water, filtering runoff, abating floods, and decreasing erosion. In addition, wetlands provide habitat for countless numbers of plants and animals including over 40% of all federally listed threatened or endangered species. Many wetland plants and animals support recreation and commercial industries. For example, wetlands act as nurseries for over 80% of coastal fisheries. In addition, millions of Americans are annually drawn to wetlands for bird watching, hunting, fishing, and enjoying the natural beauty of wetland ecosystems. Although wetland loss rates are slowing, the United States continues to lose approximately 70,000 to 90,000 acres of wetlands on non-federal, rural lands each year.

Access to Detailed Data

Access to detailed data for each data layer is available through "Surf Your Watershed" at:

<<http://www.epa.gov/surf/IWI/data>>. Click on the data layer of interest to find documentation and FTP (File Transfer Protocol) addresses.

Description of the Data Layer

Natural Resources Conservation Service (NRCS) reports on wetland acreage on rural, non-federal lands that constitute about 75% of the Nation's land base. (*Reported at 6-digit accounting unit*)

Using the 1992 NRI, watersheds were identified that had an 80 percent probability or greater of having a net wetland loss of more than 2 percent over the 10-year period. Since the NRI is a sample, and not a census, estimates of wetland acreage in 1982 and 1992 and percent wetland loss have errors associated with them. These standard errors can be estimated from the sample data. The errors are generally larger in watersheds with fewer NRI sample points, and in watersheds that have diverse land cover. Assuming that the percent wetland loss for the NRI sampling units is approximately normally distributed, the probability that the true value exceeds a pre-determined value can be calculated from the standard errors.

Wetlands included all palustrine (inland) systems, estuarine systems with vegetation, non-vegetated estuarine systems classified as permanent open water less than 2 acres in size, riverine and marine systems not also coded as permanent open water, vegetated lacustrine (lake) systems less than 40 acres, and non-vegetated lacustrine systems not also coded as permanent open water. Palustrine wetlands made up 93.9 percent and estuarine wetlands made up 4.6 percent of all wetlands. Some wetlands went into federal ownership between 1982 and 1992, and a small amount of federally owned wetlands were sold. Since the NRI collects data on wetlands only on nonfederal land, it was assumed that the wetland status of these areas was not affected by changes in ownership.

Data Sufficiency Threshold

All available data were used.

Notes on Interpreting this Information

- *Data Need to be Much More Consistent/Much Additional Data Needed. See "Plans to Improve this Data Layer" for details.*
- *NRI data used in this analysis were adjusted to reflect differences and to account for some changes in NRCS's data collection methods. Unlike the other 14 IWI data layers, these data were estimated at the 6 digit Accounting Unit scale (each 6 digit unit contains several 8 digit units). The IWI distributed the Accounting Unit estimates evenly to each of the component 8 digit Cataloging Units.*
- *The NRI does not collect data on federal lands and data collection on tribal lands is not consistent.*

Plans to Improve this Data Layer

1) U.S. EPA is working towards reporting on both the quantity and quality of wetlands. However, wetland biological monitoring programs are still in their infancy. As States establish wetland monitoring programs and include this information in their 305(b) reports, better data will be available for this data layer.

2) U.S. EPA is continuing to work with the USFWS and NRCS to monitor wetland loss and report improvements in wetland acreage. The Federal Geographic Data Committee Wetlands Subcommittee is exploring new approaches of tracking wetland acreage, reporting more frequently, and reporting at the 8-digit watershed level.

3) U.S. EPA is looking at other sources of data that could be used as an indicator of wetland condition such as the increases in impervious surfaces, and housing development trends.

For More Information Contact:

Database Owners:

NRI: USDA National Resources Conservation Service (NRCS)

Individual Contacts:

NRI: Bob Kellogg

E-mail: rkellogg@nhq.nrcs.usda.gov

Phone: (202) 690-0341

Data Source:

Natural Resources Inventory (NRI), 1982 and 1992

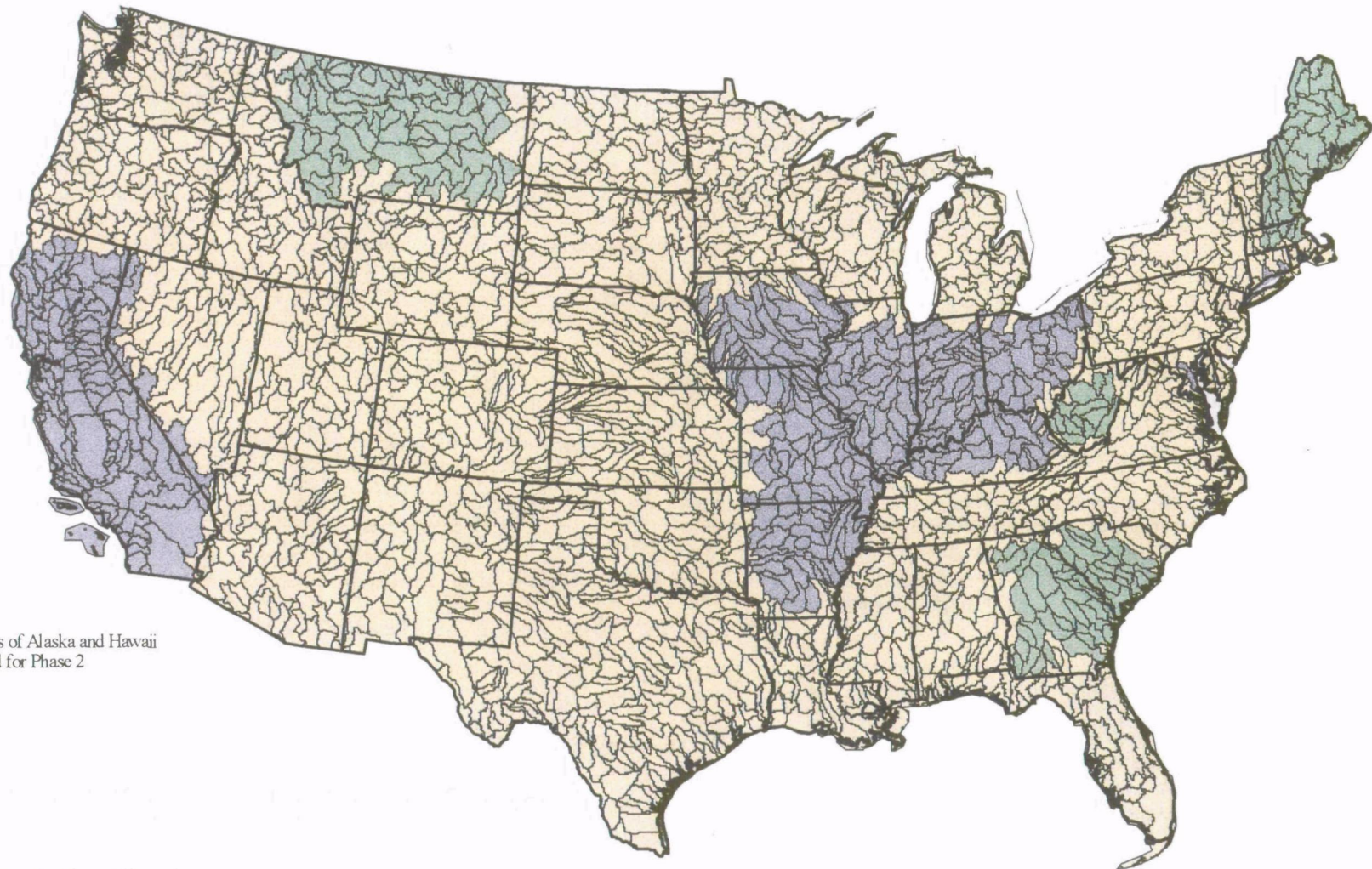
Additional Information

For additional information about the wetlands data layer, contact:

Tom Danielson, U.S. Environmental Protection Agency, Wetlands Division




E-mail: Danielson.Tom@epamail.epa.gov Phone: (202) 260-5299

7b. Wetland Loss Measured by the National Wetlands Inventory 1780s - 1980s



Analysis of Alaska and Hawaii
reserved for Phase 2

Watershed Classification

-  Low Level of Wetland Loss
-  Moderate Level of Wetland Loss
-  High Level of Wetland Loss

Index of Watershed Indicators

Source: U.S. Fish and Wildlife Service



Importance of Wetland Loss Measured by the NWI

Wetlands have not always been recognized as important to aquatic system health. In times past, they have been intentionally drained and filled as land was developed, and as a result, loss of wetlands has been substantial. The result has been loss of habitat and loss of watershed capacity for flood retention. This information shows the extent of the loss of this resource since Colonial times, and is a measure of the long-standing resource reduction that threatens streams and rivers today. The National Wetlands Inventory plans, directs, coordinates, and monitors the gathering, analysis, dissemination, and evaluation of information relating to the location, quantity, and ecological importance of the Nation's wetlands.

Access to Detailed Data

Access to detailed data for each data layer is available through "Surf Your Watershed" at:

<<http://www.epa.gov/surf/IWI/data>> Click on the data layer of interest to find documentation and FTP (File Transfer Protocol) addresses.

Description of the Data Layer

The data used in the National Wetlands Inventory (NWI), 1780s-1980s) provides historical data from the U.S. Fish and Wildlife Service on wetland acreage on federal and non-federal lands. (*State level*)

Data Sufficiency Threshold

All available data were used.

Notes on Interpreting this Information

- *Data Need to be Much More Consistent/Much Additional Data Needed*
See "Plans to Improve this Data Layer" for details
- *The historical NWI data were designed to track wetland change on a state-wide basis and, in most cases, do not provide robust watershed information.*
- *Unlike the other 14 IWI data layers, these data are reported at the 6 digit accounting unit scale (each 6 digit unit contains several 8 digit units), which IWI interpolated to the 8 digit area.*
- *Since NWI data are reported by state, the loss estimated for watersheds lying in two or more states may not reliably reflect the NWI historical data.*

Plans to Improve this Data Layer

1. U.S. EPA is working towards reporting on both the quantity and quality of wetlands. However, wetland biological monitoring programs are still in their infancy. As States establish wetland monitoring programs and include this information in their 305(b) reports, better data will be available for this data layer

2. U.S. EPA is continuing to work with the USFWS to monitor wetland loss and report improvements in wetland acreage. The Federal Geographic Data Committee Wetlands Subcommittee (which includes U.S. EPA, USFWS, NRCS, and other federal agencies) is exploring new approaches of tracking wetland acreage, reporting more frequently, and reporting at the 8-digit watershed level

For More Information Contact:

Database Owners:

NWI: U.S. Fish and Wildlife Service (USFWS) Internet: <http://www.nwi.fws.gov/>

Individual Contacts:

NWI: Tom Dahl

E-mail: Tom_Dahl@mail.fws.gov

Phone: (813) 570-5429

Data Source:

National Wetlands Inventory (NWI), 1780s-1980s

Additional Information

For information about wetlands, contact:

EPA Wetlands Information Hotline (contractor operated)

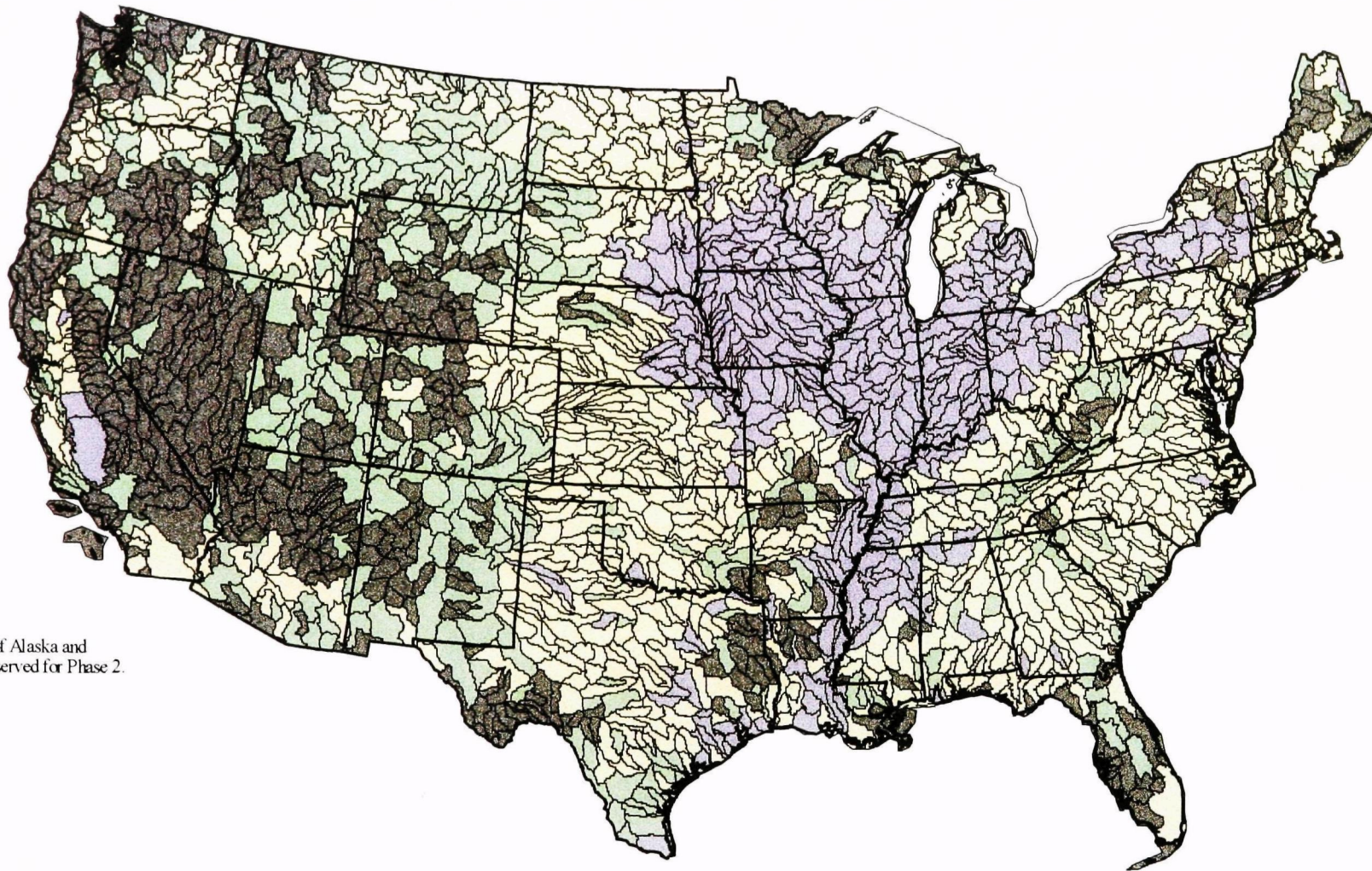
1-800-832-7828 or <http://www.epa.gov/OWOW/wetlands/wetline.html>

For additional information about the wetlands data layer, contact:

Tom Danielson, U.S. Environmental Protection Agency, Wetlands Division

E-mail: Danielson.Tom@epamail.epa.gov Phone (202) 260-5299

12a. Potential Pesticide Runoff from Farm Fields 1990 - 1995



Watershed Classification

- Low Potential for Runoff
- Moderate Potential for Runoff
- High Potential for Runoff
- Insufficient IWI Data

Index of Watershed
Indicators

Source: Natural Resources Conservation Service



Map 12a

Importance of Potential Pesticide Runoff from Farm Fields

Pesticide loss from farm fields is an important source of water quality degradation in some watersheds. This indicator was developed to show which watersheds have the greatest potential for the movement of agricultural pesticides from farm fields through surface water runoff. The indicator represents potential loss at the edge of the field based on the factors that are known to be important determinants of pesticide loss, including: 1) soils characteristics, 2) historical pesticide use, 3) chemical properties of the pesticides used, 4) annual rainfall and its relationship to runoff, and 5) major field crops grown in 1992. Watersheds with high scores have a greater risk of pesticide contamination of surface water than those with low scores.

Access to Detailed Data

Access to detailed data for each data layer is available through "Surf Your Watershed" at: <http://www.epa.gov/surf/TWI/data>. Click on the data layer of interest to find documentation and FTP (File Transfer Protocol) addresses.

Description of the Data Layer

Using national-level databases, a simulation was conducted of potential pesticide losses from representative farm fields. About 170,000 Natural Resources Inventory (NRI) sample points were treated as "representative fields." Thirteen crops were included in the simulation: barley, corn, cotton, oats, peanuts, potatoes, rice, sorghum, soybeans, sugar beets, sunflowers, tobacco, and wheat. The potential for pesticide loss from each "representative field" was estimated using the state average pesticide application rate and percent acres treated from the National Pesticide Use Database. The maximum percent runoff loss over a 20-year simulation of rainfall from the Pesticide Loss Database was imputed to NRI sample points using match-ups by soil properties and proximity to 55 climate stations. The total loss of pesticides from each "representative field" was estimated by summing over the loss estimates for all the pesticides that the National Pesticide Use Database reported for each State and crop. Watershed scores were determined by averaging the scores for the NRI sample points within each watershed.

Data Sufficiency Thresholds

No data sufficiency threshold was applied.

Notes on Interpreting this Information

- *Data Consistent/Sufficient Data Collected*
See "Plans to Improve this Data Layer" for details.
- *The indicator measures only the potential for pesticides to run off farm fields. It does not estimate actual pesticide loss*

- *Research has shown that pesticide loss from farm fields can be substantially reduced by management practices that enhance the water holding capacity and organic content of the soil and reduce water runoff. Where these practices are being used, the potential loss measured by this indicator will be over-estimated.*
- *Pesticide loss from farm fields does not always translate to water quality impairment. Pesticides degrade during transport from the farm field to the water body. Dilution by runoff from non-cropland areas in the watershed will also reduce concentrations observed in surface water.*
- *The indicator does not include fruits, nuts, and vegetables. Watersheds with large acreage of these crops will have a greater risk of water quality contamination than shown by this indicator.*
- *Estimates using the NRI report conditions on non-federal rural lands. In watersheds with significant Federal or Tribal lands not inventoried in the NRI, estimates may not reflect the vulnerability accurately.*

Plans to Improve this Data Layer

Research is underway to incorporate relative toxicity of the pesticides in the aggregation scheme. The present indicator treats all pesticides as equally risky to the environment, even though some pesticides have lower "safe" thresholds than others.

For More Information Contact:

Database Owner

Natural Resources Conservation Service, U.S. Department of Agriculture

Individual Contact

Robert Kellogg, NRCS/USDA

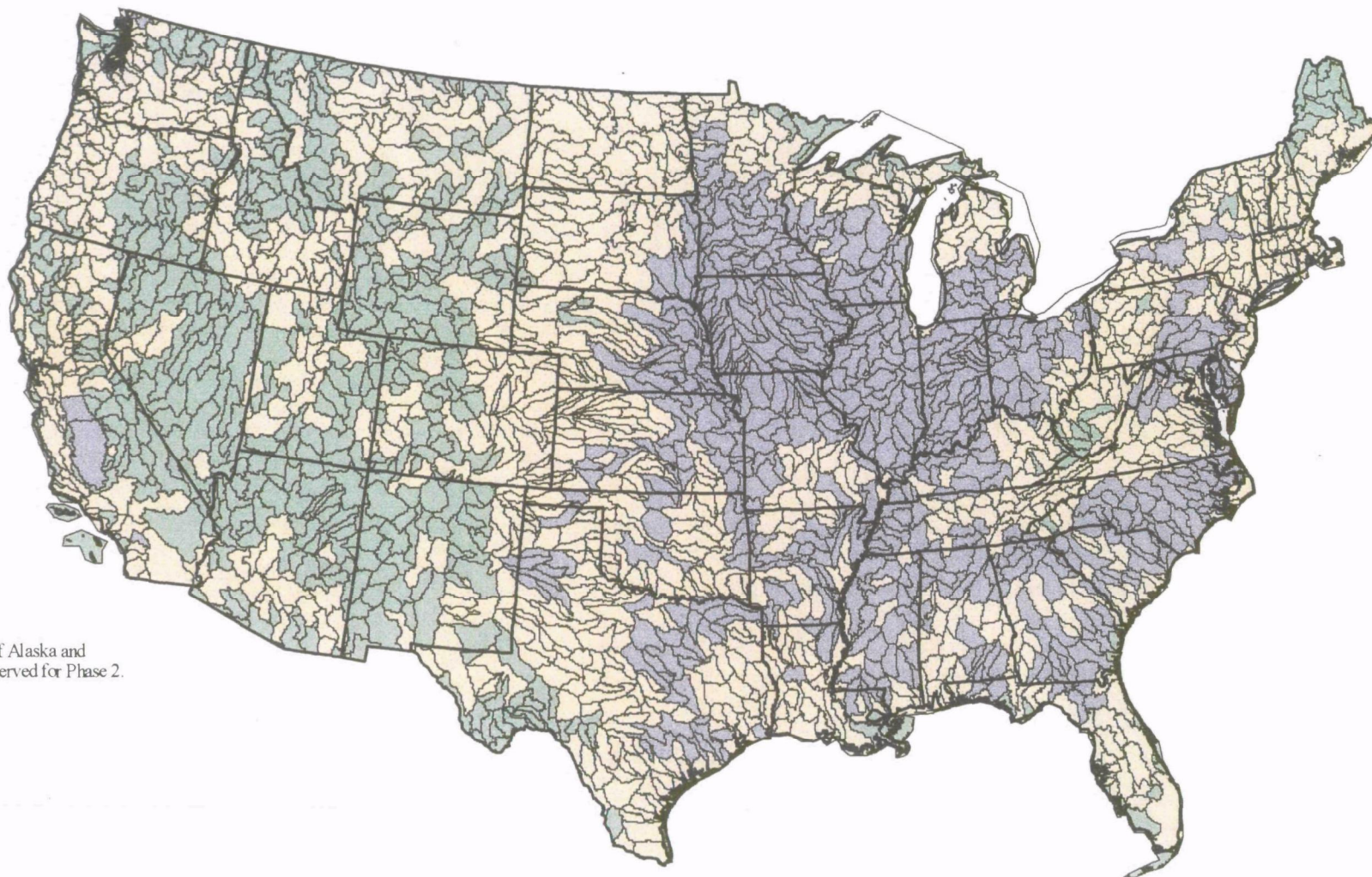
E-mail: robert.kellogg@usda.gov

Phone: (202) 690-0341

Data Source:

1. National Resources Inventory
U.S. Dept. of Agriculture, National Resources Conservation Service, 1992
2. National Pesticide Use Database
Gianessi, Leonard P., and James Earl Anderson. Pesticide Use in U.S. Crop Production: National Data Report. National Center for Food and Agricultural Policy, Washington D.C., February 1995.
3. Pesticide Loss Database
Don W. Goss, Texas Agricultural Experiment Station, Temple, Texas

12b. Potential Nitrogen Runoff from Farm Fields 1990 - 1995



Analysis of Alaska and
Hawaii reserved for Phase 2.

Watershed Classification

- Low Potential for Runoff
- Moderate Potential for Runoff
- High Potential for Runoff
- Insufficient IWI Data

Index of Watershed
Indicators

Source: Natural Resources Conservation Service

EPA
June 22, 1997

Map 12b

Importance of Potential Nitrogen Runoff from Farm Fields

Nitrogen runoff from farm fields can contribute to eutrophication of downstream waterbodies and sometimes impair the use of surface water for drinking water purposes. This indicator was developed to show which watersheds had the greatest potential for agricultural sources of nitrogen loadings to surface water. It represents potential nitrogen runoff at the edge of the field based on commercial fertilizer applications, uptake of nitrogen by crops, potential nitrogen loadings from confined animal waste disposal, and annual rainfall and its relationship to runoff. Watersheds with the highest scores have a greater potential of significant nitrogen loadings from agricultural sources than watersheds with low scores.

Access to Detailed Data:

Access to detailed data for each data layer is available through "Surf Your Watershed" at: <http://www.epa.gov/surf/IWI/data>. Click on the data layer of interest to find documentation and FTP (File Transfer Protocol) addresses.

Description of the Data Layer

This indicator is a composite of two separate indices: a vulnerability index for the potential for commercial fertilizer to run off from farm fields, and an index of the runoff potential for manure nitrogen. The nitrogen commercial fertilizer index was constructed using the National Resources Inventory (NRI) as a modeling framework. About 160,000 NRI sample points were treated as "representative fields." Crops include corn, soybeans, wheat, cotton, barley, rice, and sorghum. A per-acre estimate of pounds of nitrogen available for runoff at the edge of field was calculated as the difference between the rate of application per treated acre and the amount of nitrogen taken up by the harvestable portion of the crop. The amount of nitrogen taken up by the harvestable portion of the crop was estimated by multiplying the percent of nitrogen in the grain times the county per-acre average yield for 1988-1992. The vulnerability index was constructed by multiplying the per-acre amount of nitrogen available for runoff by a runoff factor for the two months following planting for each "representative field." The runoff factor was based on rainfall and the curve number method of estimating surface runoff from a field. The average vulnerability index for all "representative fields" in a watershed was used to characterize the potential for commercial fertilizer to run off from farm fields.

The runoff potential for manure nitrogen per watershed was based on manure loadings derived from confined livestock inventories reported in the 1992 Agriculture Census database. The total pounds of nitrogen in manure was multiplied by an average 12-month runoff factor for each watershed to create the index.

The composite indicator was constructed by ranking the two indexes and summing the ranks for each watershed.

Data Sufficiency Thresholds

No data sufficiency threshold was applied.

Notes on Interpreting this Information

- *Data Consistent/Sufficient Data Collected.*
See "Plans to improve this Data Layer" for details.
- *The indicator measures only the potential for nitrogen to run off farm fields. It does not estimate actual nitrogen runoff loss.*
- *Farm management practices are not included in the determination of the indicator. Research has shown that nitrogen loss can be substantially reduced by careful timing of nitrogen applications and management practices that reduce water runoff. Where these practices are being used, the potential loss measured by this indicator will be over-estimated.*
- *Nitrogen loss from farm fields does not always translate to water quality impairment. Dilution by runoff from non-cropland areas in the watershed will reduce nitrogen concentrations observed in surface water.*
- *The index for commercial fertilizer applications only includes estimates for 7 crops. Watersheds with large acreage of other crops where commercial nitrogen fertilizer is applied will have a greater risk of water quality contamination than shown by this indicator.*
- *Estimates of manure loadings are not adjusted for animal waste treatment facilities (such as lagoons) although they are adjusted for storage losses and volatilization of nitrogen during application. Where animal waste treatment facilities are used, the indicator will over-estimate manure loadings.*
- *Estimates using the NRI represent non-federal rural lands. In watersheds with significant Federal or Tribal lands not inventoried in the NRI, estimates may not reflect the vulnerability accurately.*

Plans to Improve this Data Layer

Research is underway to more precisely estimate nitrogen loss from farm fields, and to include additional crops.

For More Information Contact:

Database Owner:

U.S. Department of Agriculture, Natural Resources Conservation Service

Individual Contact:

Robert Kellogg, NRCS/USDA

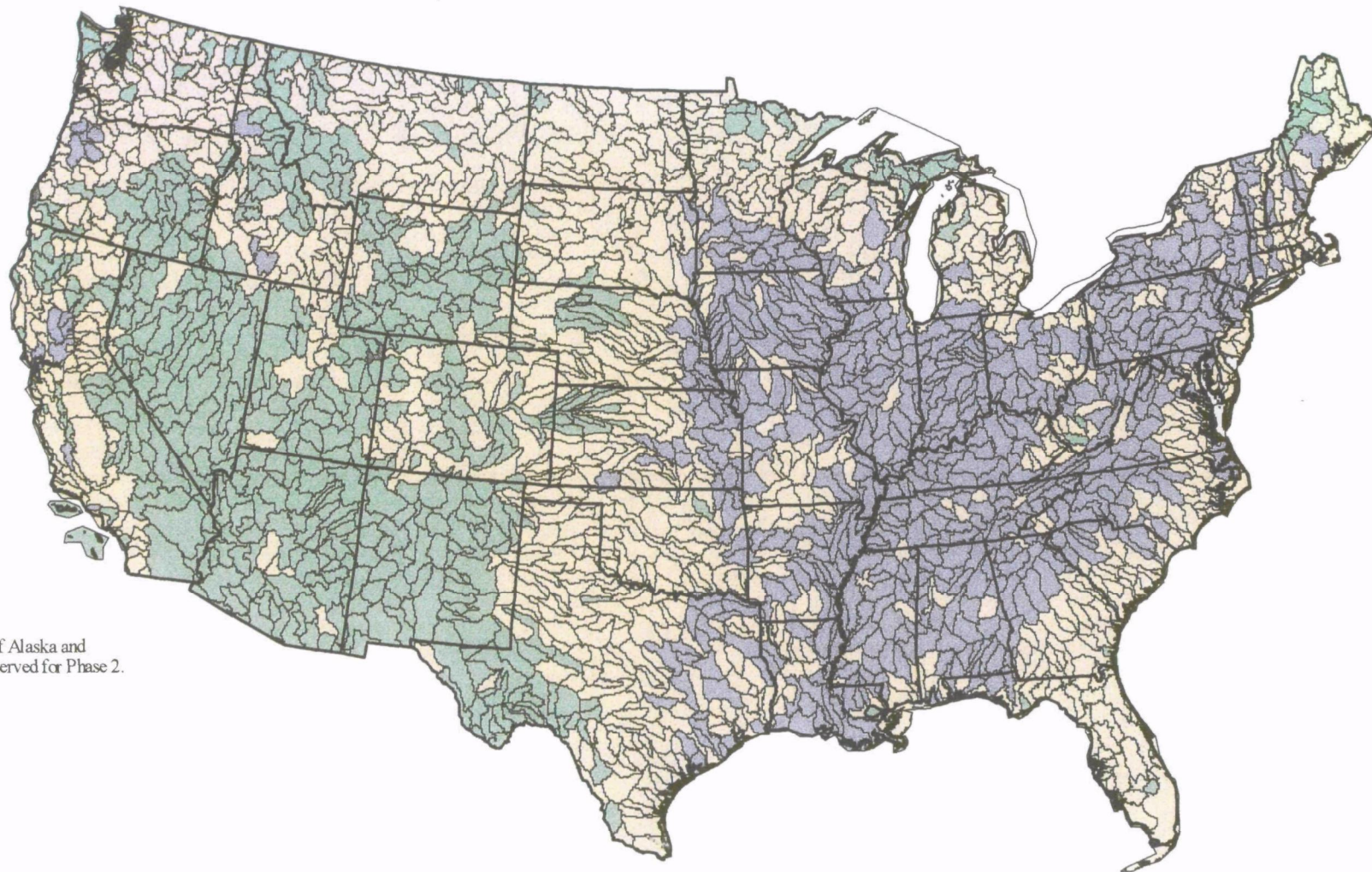
E-mail: robert.kellogg@usda.gov

Phone: (202) 690-0341

Data Source:

1. National Resources Inventory, U.S. Department of Agriculture, Natural Resources Conservation Service, 1992
2. Nitrogen Use Statistics; U.S. Department of Agriculture, Economic Research Service
3. Crop Yield Data; U.S. Department of Agriculture, National Agricultural Statistics Service
4. Census of Agriculture, 1992, Bureau of the Census

12c. Sediment Delivery to Rivers and Streams from Cropland and Pastureland 1990 - 1995



Analysis of Alaska and
Hawaii reserved for Phase 2.

Watershed Classification

Low Potential for Delivery
Moderate Potential for Delivery
High Potential for Delivery
Insufficient IWI Data

Index of Watershed Indicators

Source: Natural Resources Conservation Service



Map 12c

Importance of Sediment Delivery to Rivers and Streams from Cropland and Pastureland

Soil eroding from agricultural land can be transported by water runoff to rivers and streams and degrade the quality of surface water. Carried with this soil is organic matter which also degrades the quality of streams, rivers, and estuaries. The potential for soil erosion varies from watershed to watershed depending on the extent of agricultural land in the watershed, rainfall amounts and intensity, soil characteristics, landscape characteristics, cropping patterns, and farm management practices. These factors were included in a national-level simulation model that was used to estimate the amount of sediment delivered to rivers and streams in each watershed. The simulation estimated sheet and rill erosion; gully erosion was not included.

Access to Detailed Data

Access to detailed data for each data layer is available through "Surf Your Watershed" at: <<http://www.epa.gov/surf/IWI/data>> Click on the data layer of interest to find documentation and FTP (File Transfer Protocol) addresses.

Description of the Data Layer

The simulation was conducted as part of the Hydrologic Unit Modeling of the United States (HUMUS) project, which incorporates several national-level natural resource and land use databases and a variety of process models in a Geographic Information System. The framework for the national simulation consists of the 2,111 hydrologic units in the 48 States. Each hydrologic unit is divided into subareas according to the major land uses. Up to 14 subareas per watershed are available to represent cropland and pastureland (7 irrigated, 7 nonirrigated). Soils characteristics for each subarea are taken from the STATSGO soils database. A 30-year weather database is available for each watershed. A process model incorporating hydrology, weather, sedimentation, crop growth, and agricultural management (SWAT--Soil and Water Assessment Tool) is applied to each subarea to simulate the relationships among rainfall, runoff, leaching, groundwater return flow, farm management practices, erosion, and surface flow in rivers and streams.

SWAT is a continuous time model that operates on a daily time step for each of the 30 years of the weather database. One of the outputs of the model is average annual sediment delivery to rivers and streams from sheet and rill erosion from cropland and pastureland, as shown on this map.

Data Sufficiency Thresholds

No data sufficiency threshold was applied.

Notes on Interpreting this Information

- *Data Consistent/Sufficient Data Collected*
See "Plans to Improve this Data Layer" for details.
- *Sediment loads from nonagricultural land uses are not included in these estimates. Estimates represent loadings delivered to rivers and streams, and do not represent in-stream loads. Gully erosion and channel erosion are also not included*

Plans to Improve this Data Layer

The data and models used by HUMUS are continually updated and refined. There are plans to improve sediment estimates by comparing model results for in-stream loadings to actual loadings and adjusting the parameters of the model where needed. HUMUS will also be expanded to estimate sediment loadings from nonagricultural areas and other sources of erosion.

For More Information Contact:

Database Owner:

Texas Agricultural Experiment Station, Temple, Texas

Individual Contact

Clive Walker, Texas Agricultural Experiment Station, Temple, Texas

E-mail: walker@brcsun0.tamu.edu

Phone: (817) 770-6655

Data Source:

HUMUS (Hydrologic Unit Modeling of the United States)

Contacts for Further Information

Many individuals and organizations contributed information to and review of the Index of Watershed Indicators, and we thank them all. It has been a pleasure working with so many dedicated and knowledgeable partners. For further information or to answer questions you may have, there are many contacts, some of which we list below.

Surf Your Watershed:

As a first step to answer questions, we urge you if possible to go to the Internet program "Surf Your Watershed" at <http://www.epa.gov/surf>. Surf provides additional information about each watershed in the Index of Watershed Indicators, individual contacts for particular kinds of data, more detailed background data (such as lists of the specific fish advisories in effect in the watershed) and also links to much information in addition to the 15 indicators we used for the Index of Watershed Indicators. Internet also allows us to easily provide updated information in a way not possible in a published paper product. For further information on "Surf" call Karen Klima at (202) 260-7087 (E-mail Klima.Karen@epamail.epa.gov)

If you do not find the information you need on "Surf Your Watershed," you can call the following:

The Index of Watershed Indicators process:

Sarah Lehmann at EPA Headquarters on 202 260-7021 (E-MAIL Lehmann.Sarah@epamail.epa.gov)

Index of Watershed Indicators:

- o Overall assessment of data: Charles Spooner, EPA Headquarters on (202) 260-1314 (E-MAIL Spooner.Charles@epamail.epa.gov)
- o Contacts for each indicator are listed on the individual maps

Monitoring Information:

Call 202 260-7040 and ask for the Monitoring Publications List.

Regional Contacts: Each EPA region has an Index of Watershed Indicators contact who can answer your questions or direct you to the right source:

Region 1: Trish Garrigan 617 565-4728
CT, ME, MA, NH, RI, VT

Region 2: Larry Rinaldo 212 637-3820
NJ, NY, PR, VI

Region 3: Stuart Kerzner 215 566-5709
DE, DC, MD, PA, VA, WV

Region 4: David Melgaard 404 562-9265
AL, FL, GA, KY, MS, NC, SC, TN

Region 5: Tim Henry 312 886-6107
IL, IN, MI, MN, OH, WI

Region 6: Charlie Howell 214 665-8354
AR, LA, NM, OK, TX

Region 7: Julie Elfving 913 551-7475
IA, KS, MO, NE

Region 8: Jill Minter 303 312-6084
CO, MT, ND, SD, UT, WY

Region 9: Janet Hashimoto 415 744-1933
AZ, CA, HI, NV, AS, GU

Region 10: Pat Cirone 206 553-1597
AK, ID, OR, WA